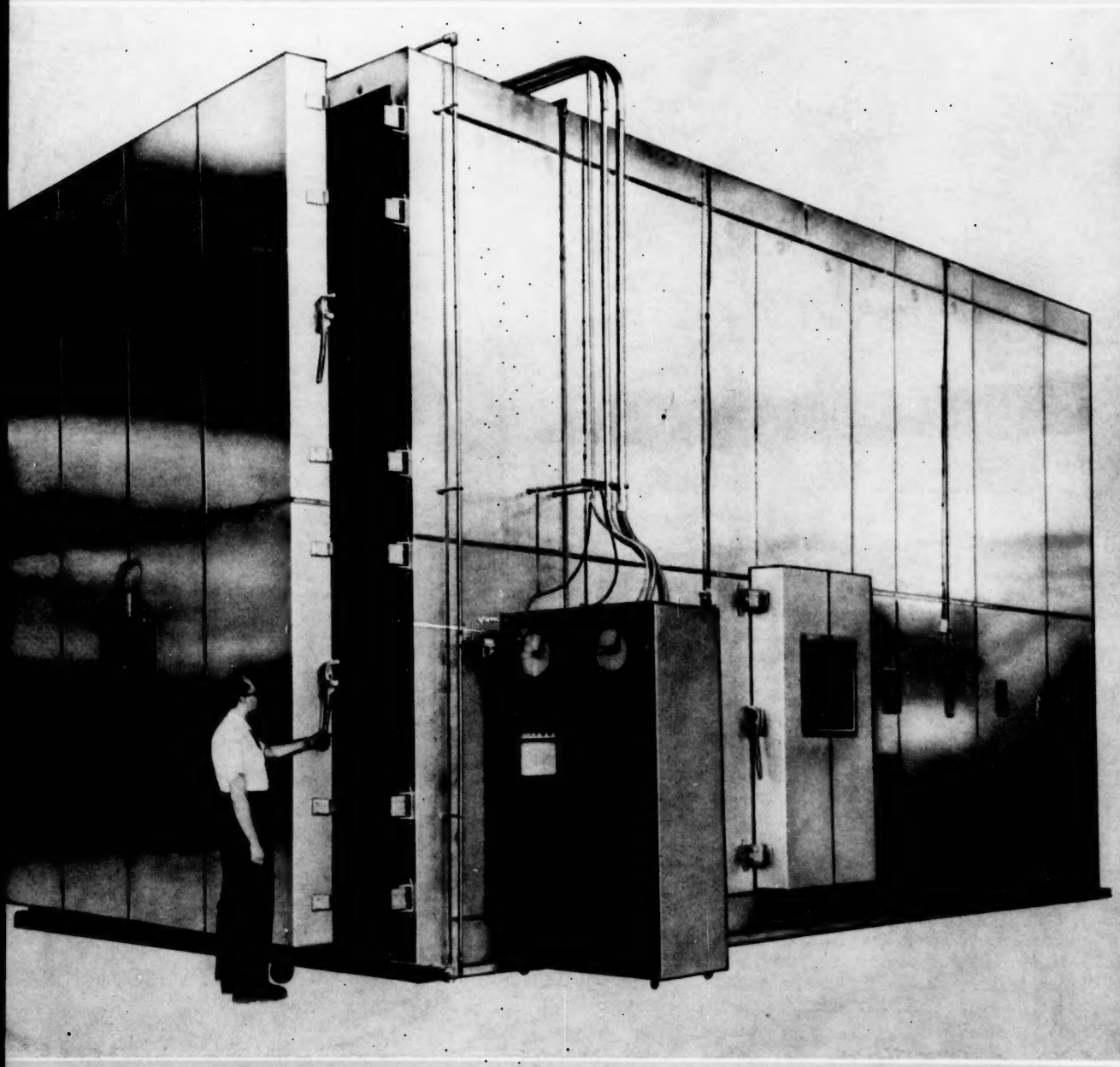
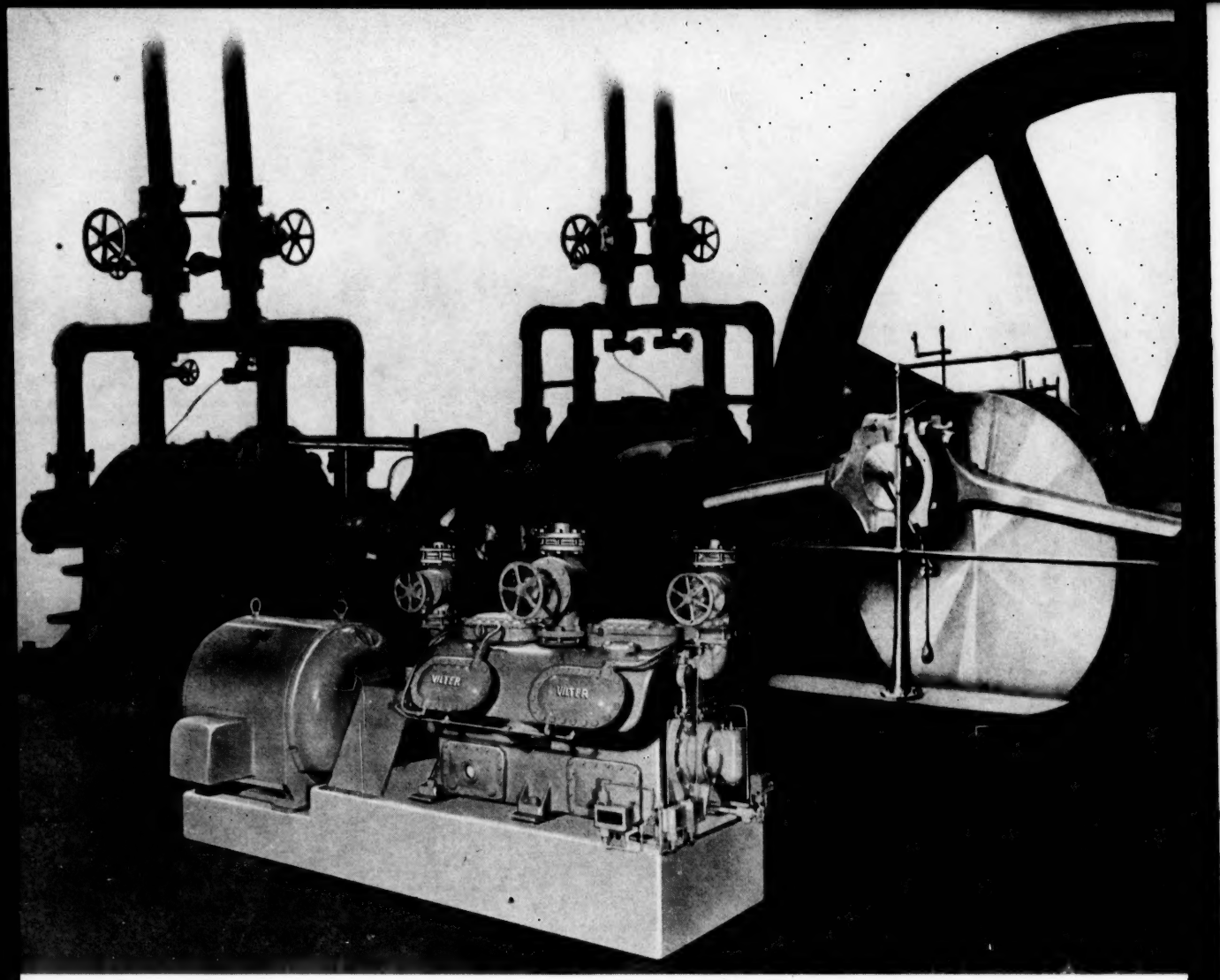
INDUSTRIAL REFRIGERATION

November, 1958

Vol. 135, No. 5



Environmental Testing By the Truck Load at Minus 100 F



Keeping Pace with Modernization!

Vilter specifies Texaco Capella Oil Waxfree

Today's Vilter VMC Compressors incorporate 91 years of manufacturing know-how. To assure continued first-rate performance, The Vilter Manufacturing Company has set up rigid standards for its compressor oils—standards which are met by Texaco Capella Oil Waxfree.

Vilter chose Texaco Capella Oils Waxfree because of their outstanding performance. Even at temperatures as low as minus 100°F., for instance, waxout does not occur in systems where a miscible-in-oil refrigerant is used. Texaco compressor lubricants have excellent non-foaming characteristics, resist oxidation, and are completely stable with all refrigerants.

There is a complete line of Texaco Capella Oils Waxfree to meet all compressor requirements. They are carefully packed to exclude all moisture, and are available in 5- and 55-gallon drums. The most popular grades are also available in 1-quart containers. For assistance in selecting the right grade for your operation, call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

LOST

space in your building

FOUND

with

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OUTDOOR COMPRESSOR

Why lose dollar-making storage and selling space to house compressors, when you can now use the Kramer Outdoor Compressor? The THERMOBANK COMPRESSOR SYSTEM is factory assembled, tested and run-in; it saves installation time and money.

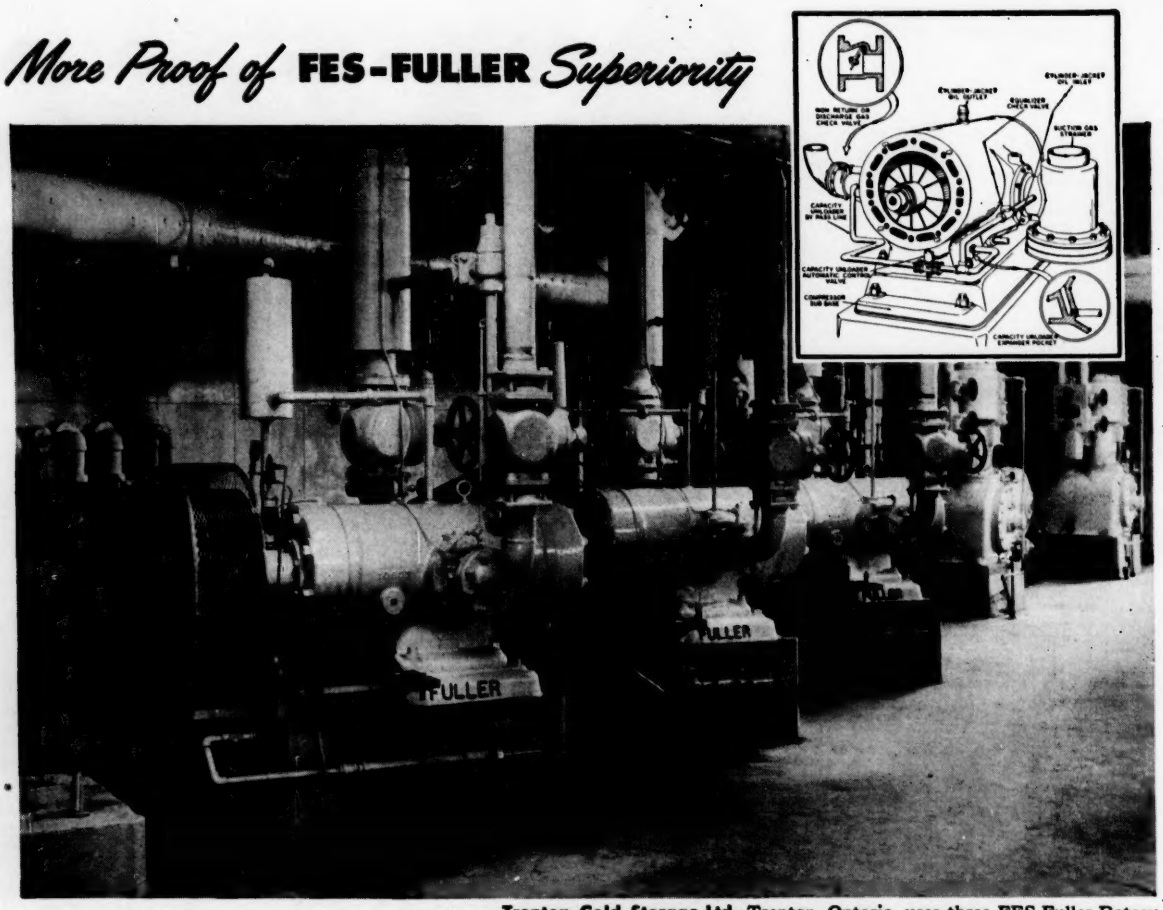
The refrigeration industry again finds Kramer blazing a new path with its THERMOBANK SYSTEM—the original and only automatic re-evaporating, non-overloading, fastest hot gas defrost system—now engineered to perform unfailingly, not only in a heated space but in any unheated space or outside at any outdoor temperature.

WRITE FOR BULLETIN TC 406A

KRAMER TRENTON CO. Trenton 5, N.J.

45 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

More Proof of **FES-FULLER** *Superiority*



Trenton Cold Storage Ltd. Trenton, Ontario, uses three FES-Fuller Rotary Booster Compressors, rated at 244 tons, to maintain an even temperature of –40°F. *Installed by John Inglis Co., Limited, Toronto, Canada.*

TRENTON DROPS POWER COSTS 20% with New FES-FULLER booster installation!

Here's what Eben James, General Manager of Trenton Cold Storage, Ltd.—one of Canada's largest food freezers—says about their new FES-Fuller-designed refrigeration system:

"Our operating costs for power have dropped 20%, yet we've handled a greater volume this year than before. It has been a great satisfaction both to the operators and myself to see our plant run so smoothly."

And here's how this low-cost, efficient operation is safe-guarded by FES-Fuller Rotary Boosters:

1. **Absence of valves** and other reciprocating machinery permits continuous service for long periods, under heavy loads, without attention. Rotaries maintain full capacity for life of units.

2. **Patented jacket cooling** of FES Fuller Rotaries eliminates possibility of freezing causing damage to compressor.

3. **Vibration-free rotaries** are mounted on simple, low-cost foundations. Installation and maintenance savings are outstanding.

4. **Space-saving rotaries** mean uncluttered, efficient engine rooms. Trenton installation leaves adequate room for expansion despite ceiling height of less than 9 feet.

Freezing Equipment Sales engineers are always available for free consultation on the best ways to add to present freezer capacity, or to design new facilities. Write today for full literature on FES-Fuller Rotary Booster systems.

FES FULLER 4467 C-329

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LOW TEMPERATURE FREEZING EQUIPMENT

November, 1958

Number 5

Vol. 135

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Refrigerant aids in producing rarified sub-atmospheric conditions. Near perfect vacuums are being achieved not only in the laboratory but for industrial processes. New developments are reported in a special release to IR.

NAII Meets in Miami 12
Economic and production topics head the program of the National Association of Ice Industries meeting November 18 to 21 in Miami, Florida. Two clinic sessions are a unique feature this year in a program which highlights congressmen, legislative and market counselors.

Oscar Mayer & Co. Celebrates 75th Anniversary 13
An immigrant sausage maker established a small plant in Chicago 75 years ago. Today the third generation operates the firm which has expanded in a nationwide luncheon meat and food processing machinery firm.

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Lettuce for New Jersey markets is being cooled by a semi-trailer truck vacuum chamber and four portables.

Single-Stage Hermetic Centrifugals 22
Seasonal shutdown of centrifugal compressors used in connection with air conditioning systems is about accomplished where such a practice is followed in many parts of the country. Steps in the procedure of shutdown for a single stage hermetic unit is reviewed.

U.S. Engineers Attend International Meetings 37
Prominent figures in the U.S. refrigerating industry, from associations, government, universities and user industries attend a large number of European sessions.

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The Cover: Environmental Industry Grows

▶▶▶NEW environmental test chamber recently completed by the American Research Corp. was specifically designed to simulate temperatures between minus 100 and 200 F, with relative humidity simulation from 20 to 95 percent rh at 35 to 185 F. Chamber was completely prepackaged and installed ready for push button operation. Internal working area of the chamber is 12x25x15 ft high, permitting truck delivery of the test item into the chamber.

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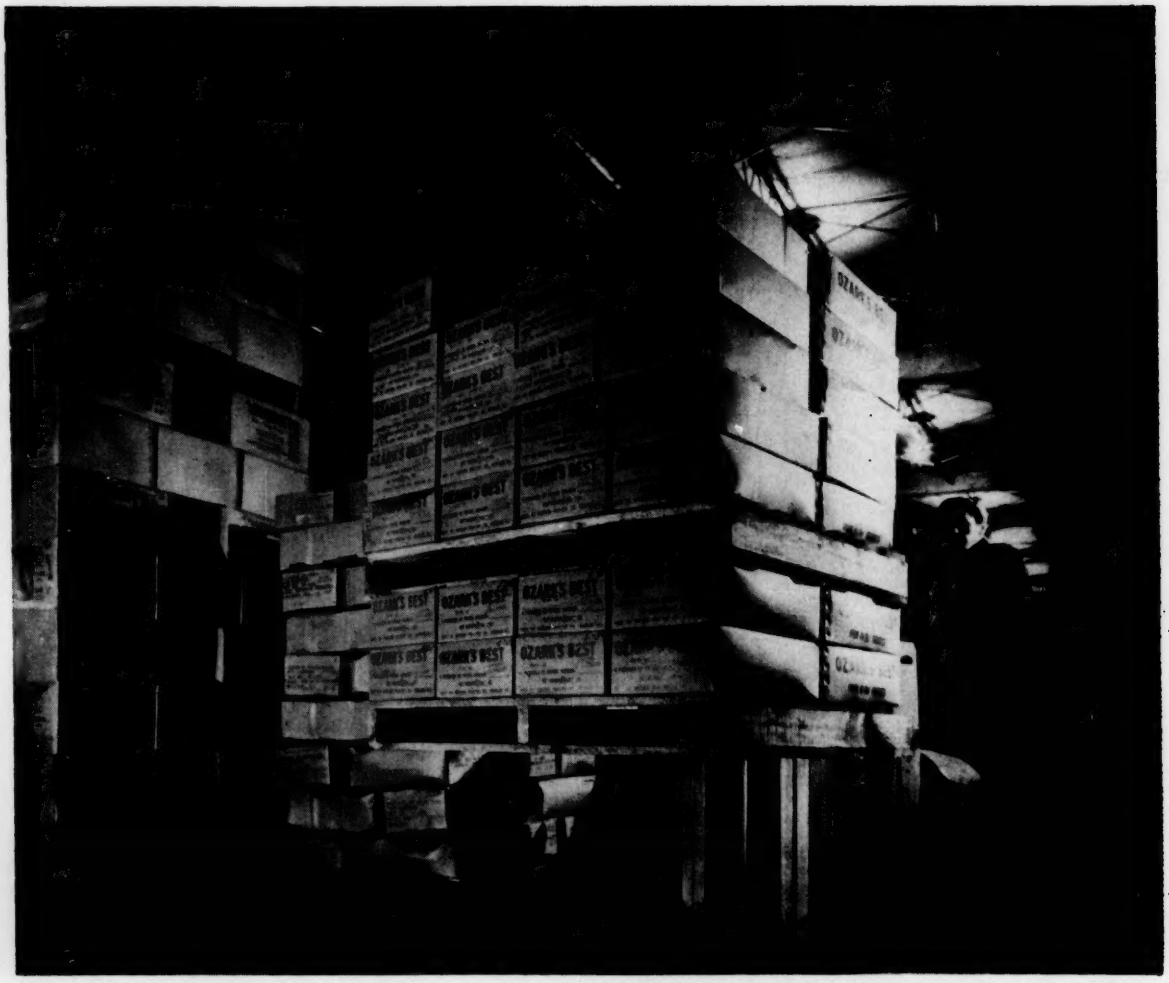
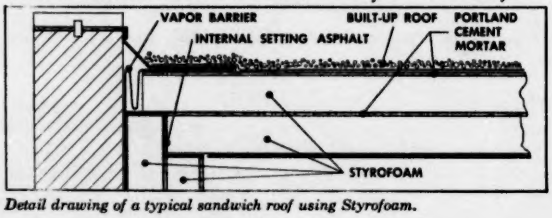


Designer: Ward Ice Industries, Ft. Smith, Arkansas. *Approved Insulation Contractor: Chris Fiedler Company, Inc., Memphis, Tennessee.*

Unique sandwich roof construction using Styrofoam® saves $20,000

Rogers Ice and Cold Storage Company, Rogers, Arkansas, put the rigidity, light weight and high compressive strength of Styrofoam* to good use in their new 24,000 sq. ft. cold storage plant.

In this sandwich roof construction, two 4" thicknesses of Styrofoam—with a ¾" layer of portland cement mortar sandwiched between them—were laid directly on the roof joists.



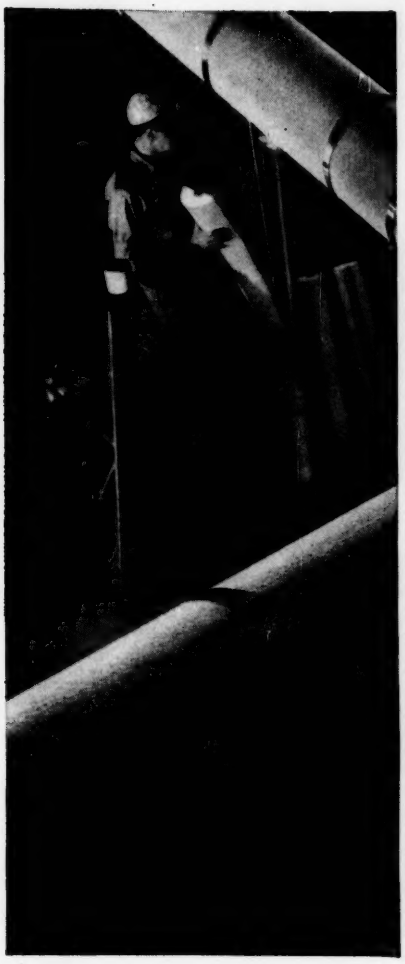
Detail drawing of a typical sandwich roof using Styrofoam.

A ½" portland cement mortar grout was put down over this sandwich and a built-up roof applied in the normal manner. The concrete slab, which is standard for this type of roof, was eliminated because Styrofoam is capable of supporting not only its own weight, but also that of the built-up roof and the foot traffic necessary for inspection and maintenance!

Eliminating the concrete slab allowed a reduction in the amount of structural steel used and, of course, an over-all reduction in labor . . . adding up to a $20,000 savings! Styrofoam, used in the floors and walls, will provide superior insulating efficiency and reduced maintenance for Rogers, too. For more information about Styrofoam in cold storage uses, contact your nearest Styrofoam distributor or write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Department 1914L.

*Dow's registered trademark for its expanded polystyrene

YOU CAN DEPEND ON DOW



Unyielding water resistance—

STYROFOAM®

for pipe covering insulation

Low-temperature pipe covering made of Styrofoam* does an excellent job and lasts a lifetime. Its unyielding resistance to moisture and its permanent low thermal conductivity prevent condensation and dripping—reduce heat transfer.

Styrofoam will not crack or split from changing temperature and it is not subject to ice buildup around valves. It's lightweight and easy to apply—requires no maintenance. A complete line of pipe and vessel covering made from Styrofoam is available from a number of fabricators. For their names and more information, write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Department 1914L.

*STYROFOAM is a registered trademark of The Dow Chemical Company

DOW

news briefs—

Compressor Shipments Climb

Manufacturer's shipments of compressor bodies through July 1958, were less than three percent behind those of the same period a year ago. This was the late October report of the Air Conditioning and Refrigeration Institute, Washington, D.C. It marks the nearest that monthly shipment figures of 1958 have made to corresponding figures in 1957. Shipments of the first 4 months of 1958 averaged 25 percent under those of last year. Things are looking up!

USDA Industry Committee To Meet

NARW's "Quick Sheet" in October carried the announcement that the USDA Committee on Refrigerated and Frozen Products (formerly the Cold Storage Research Advisory Committee) will meet in Washington on November 17-20. This government-appointed committee is one of 25 such advisory groups representing various phases of agriculture. It meets annually to formulate recommendations on research projects to be undertaken by USDA under provisions of the Research and Marketing Act of 1946.

Food Distribution— Nation's Biggest Business

National Association of Food Chains meeting at the Palmer House, Chicago, early in October, in data supplied the public and trade press drew a comparison of the food distribution business to other major sales enterprises in the United States. Food distribution is still the nation's biggest business. Sales last year totaled $47,800,000.00 compared with automobile sales of $38,900,000.00. Americans spend 25 percent of their income on food for which they buy nearly three times as much with an hour's labor than they did 40 years ago.

Ice Saves Brain Cells

Hypothermia, literally putting a patient on ice, may prevent disastrous injury to brain cells. Packing patients in ice for a quick cool down after sudden heart stoppage reduces cerebral injury. The influence of hypothermia was outlined at the 44th Clinical Congress by the American College of Surgeons meeting in Chicago early in October.

Diehl Corrects IR On TRRF

Under the subhead "Foundation Changes Hands", in the October issue on Refrigerated Warehousing Industry, IR described TRRF as "a non-profit corporation initiated and sponsored by NARW". "Dutch" Diehl, the Foundation's former director was the first to note and correct this statement. Quoting Dutch, "TRRF was not initiated and sponsored by NARW. TRRF began because Arnold Hampson, Garth Shoemaker and Jack Meagher decided in 1943 to do something about research in our industry. NARW had nothing to do with it. TRRF is an entirely separate Illinois Corporation. Of course, many NARW members are TRRF members and work closely as two industry organizations, as is proper".

What's New

MACHINERY
APPLIANCES • PROCESSES

Instruments, Recorders, Flow Controls

▶▶NEW ACCESSORIES and auxiliaries for refrigerating plants continue to be announced at a dizzy pace. Improvement and developments are not limited to the larger applications either. Instruments, recorders and flow equipment are being introduced every day. Of course not all of these can be adapted for any one plant, but many readers will find one or more items that may have a use in their own facility for improving efficiency of operations, stepping up production, or otherwise save.

Halogen Leak Detectors

▶INCREASED versatility highlights a new and complete line of halogen detectors announced by an international manufacturer. Featuring four leak detectors for use in one standard control unit, the series replaces a long established model. While this type of leak detector equipment has literally been a standard in the refrigeration and air conditioning industry, more recently tank and pipe manufacturing, automotive and packaging industry, builders of vacuum furnaces and metal coaters have started using these electronic leak detectors.

The new models are more sensitive. So sensitive as a matter of fact that any halogen compound can be introduced into any system that does not already contain a halogen gas, thereby becoming a tracer. The leak detector then picks up the tracer gas disclosing the leak in the systems under test.

Tracking Down Leaks— The Nonpaying Water User

▶A CALIFORNIA firm has developed a transistorized pipe finder for locating pipe and cable, valve boxes, sealed over well casings and various buried metal objects. While this may not be exactly new, the electronic device has the added feature of several times more sound amplification which enhances its utilization as a leak detector. Weighing only 7 pounds, it employs five miniature hermetically sealed transistors eliminating the problem of vacuum tubes and heavier battery supplied current.

Improved Sound Detector

▶SMALLEST internal defects in moving machinery can be located without shutdown or otherwise taking equipment out of service, by means of the new Binaural Engineer's Sound Detector. This light weight portable detector amplifies normally inaudible defect-caused noises and helps the user accurately locate broken, loose or worn parts in engines, gear boxes, compressors, pumps and similar equipment, regardless of size. It is also extremely useful in determining the efficiency of traps.

Detector-Controller

▶AN INDUSTRIAL nucleonics corporation has announced a tank level detector-controller for process industries. Said to be competitive price-wise with conventional flow level devices, this instrument has no part which extends into the tank or vessel. It is installed completely externally, making it free from fouling and readily accessible for maintenance. It can be made fail safe for either high-level or low-level signal.

Thermolevel Switch

▶ RUSELEN ASSOCIATES describe in a new release, the Watkins Thermolevel Switch which provides a switching action on rise or fall in liquid level. The instrument features no valves or equalizer lines and no moving parts. It is hermetically sealed and of standard steel construction, although other metals are available. The instrument works on a principle of a probe projecting into the vessel in which a liquid level is to be controlled. The two thermostats and a heater are located inside the probe section.

When the liquid rises to the probe the temperature drop makes the heater circuit through one of the thermostats and trips the other (switching) thermostat. When the liquid falls away from the probe the switching action is reversed. A heater thermostat controls the maximum temperature of the probe. The J. E. Watkins Company of Maywood, Illinois, markets this Thermolevel Switch for refrigeration and air conditioning

Liquid Flow Switch

▶A CHICAGO FIRM is marketing a flow switch which starts and stops auxiliaries from liquid flow, adding to a line which has been widely used for more than 20 years. Line voltage models have the Underwriter's Laboratory listing and are recommended for use in stopping the compressor in the air conditioning system should flow stop in the cooling tower or chilled water lines; for starting standby pumps in case of failure of primary pump. It may also be used for indicating flow or flow stoppage in processing systems.

Flow Indicator

▶CLEARLY VISIBLE from a distance, a simple, reliable safety signal type indicator has been announced by a New York firm. A chromium plated ring spinning under a toughened glass dome is useful wherever there is circulating oil or water such as cooling water of refrigerating equipment, air compressors, condensers; lubricating oil to bearings, gears, etc. The new models can be set in the field for high or low range.

Mass Flow Meters

▶A HAMPTON, Virginia firm has introduced a new type flowmeter which provides direct reading of total mass flow independent of pressure variations. These instruments are especially well suited for measuring low rates of flow such as in gas chromatography.

Portable Type Efficiency Recorder

▶DEVELOPED BY a New Jersey firm, an instrument has been marketed which is especially suited for recording the operating time of refrigeration and related machinery. It will tell when, for and how long and at what percentage of average time equipment functions.

Not only may this instrument be connected to refrigeration machines but also it may be used with thermostats to indicate when the temperature is within or exceeded preset standards. A fluctuating load can be seen at a glance. A graphic record is recorded on a chart, and no complex readings are necessary nor data interpretation required.

Industrial Thermometer

▶COMPLETELY REDESIGNED, a submarine type industrial thermometer has been introduced by a Freeport, L. I. firm. Meeting federal specifications, the unit is compact, rugged and said to be unusually efficient in industrial applications where space is an important factor. It is available in standard ranges, either brass or monel sockets, in five different rigid angles or with a patented adjustable angle.

Recording Thermometer For Transportation

▶MILE-BY-MILE automatic and continuous record of low temperatures is achieved with a newly developed all weather temperature recorder recently introduced by another New York firm. The instrument is mercury actuated requiring no external power source and offers high resistance to road shock and vibration. Accuracy within one percent is claimed. The mechanism is housed in a tamperproof case which may be locked. A capilary tube emerges through the back of the case which may be suspended in close proximity to the load. The 8-day clock is available with 24-hour, 48-hour or 7-day charts.

Remote Reading Counter For Liquid Meters

▶LIQUID METERS are often mounted in inaccessible places. A Wisconsin firm has recently introduced an electric counting device for a Vortex type meter which operates by remote control. The counter is mounted in any convenient eye level location, even though the meter itself may be hidden away in a maze of piping or industrial process application. A key resets each counter instantly and makes it tamperproof.

New Pressure Regulator For Air Volume Control

INDIVIDUAL room control of air volume in office buildings, hotels, clubs, hospitals and restaurants is provided by a new static pressure regulator announced recently by a Skokie, Ill. manufacturer of automatic temperature controls. The unit is installed on ceiling or window mixing boxes in high velocity air conditioning systems where it maintains a constant air delivery from the plenum or mixing box regardless of changes in the hot or cold air supply.

Industrial Solenoids

TWO MORE specially engineered soloenoid valves for the industrial field have been introduced by a St. Louis, Missouri firm. This completes the range from 5/16 to 1-1/2-in. port diameters for use with water, air, light oils, brine, industrial and L.P. gases and other non-corrosive fluids. Feature of this line is low cost, dependable operation. They can be mounted in any position.

Two-Way Valves

HIGH FLOW two-way valves with 3/4 and 1-in. diameter orifices have been added to 3/8 and 12-in. sizes, recently introduced by a Connecticut firm. Available in standard and explosion proof construction, NO or NC, they mount directly to a line in any position and can be serviced without removal. They are designed to control common media such as air, oil and water.

Refrigerant Coupling

GREATLY IMPROVED, a self-sealing coupling has been developed by a Michigan firm known for its low temperature flexible hose assemblies for aircraft, industrial, farm, marine and railroad uses. The new coupling specifically designed for air conditioning and refrigeration applications, is suitable for use with numerous refrigerants and refrigerating compounds. The coupling permits factory testing and precharge of components which can be shipped and stored fully charged with refrigerant, substantially reducing field installation time and costs. When it is disconnected the coupling is sealed tight to prevent loss of refrigerant and admission of air and foreign particles into the system.

Emergency Pipe Clamp

MAKERS of an emergency pipe clamp for half a century, a South Bend, Indiana firm has just introduced a junior companion. It is made up in a single bolt width instead of the customary two-bolt. Installation is astonishingly quick. Just place the narrow or top part of the clamp on the pipe opposite the leak and hook-up the wide gasketed half on the hinge. Press the gasket half against the leak and the bolt automatically falls into place. Tightening the nut completes the job. Made of malleable iron construction the clamp is resistant to erosion and corrosion.

Shown is the 84' x 42' x 4'6" chilling tank. At the end of the tank there is a reversible conveyor so that the crates of corn or other vegetables can be conveyed either directly to the refrigerator cars or to the storage room.

Shown are four Vilter 8-cylinder ammonia compressors with 100 h.p. direct-connected motors. Control switches are installed to equalize the wear on each compressor. Vilter vertical condensers are shown in left foreground.

VILTER "Chills-in"

Sunshine Freshness of Florida Produce

Chilling-in the sunshine freshness of Florida vegetables is the task cut out for a new Vilter vegetable pre-cooling installation recently completed for Southbay Growers, Inc., of Southbay, Florida.

The plant was installed to chill locally grown produce from field temperature to about 38° to 40° in various periods of time, depending upon the product being chilled. Sweet corn and celery are the most important products. They frequently run on corn and celery simultaneously and the chilling capacity is as high as five carloads per hour . . . 2500 crates.

The principal pieces of equipment supplied for this job include four 8-cylinder Vilter ammonia VMC's, four vertical shell and tube condensers a receiver, some three miles of 2" pipe arranged as flooded vertical tank coils, and four vertical agitators.

All concerned have expressed complete satisfaction with the performance of the Vilter installation.

Vilter equipment does its job well—efficient, economical performance . . . low maintenance . . . long life.

It will pay you to talk with experienced Vilter people in planning for your refrigeration requirements. Regardless of the type of refrigeration you need, Vilter can supply you.

Sold and Installed by Vilter Distributor, W. L. Filbert Co., Miami, Florida

Write for these helpful bulletins to: The Vilter Manufacturing Company, Dept. H-803, 2217 S. First Street, Milwaukee 7, Wisconsin.

Bulletin 707 Vilter Condensers Brine Coolers Heat Exchangers

Bulletin 817 Vilter VMC Ammonia Compressors

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REFRIGERATION and AIR CONDITIONING

THE VILTER MANUFACTURING COMPANY, Milwaukee 7, Wisconsin

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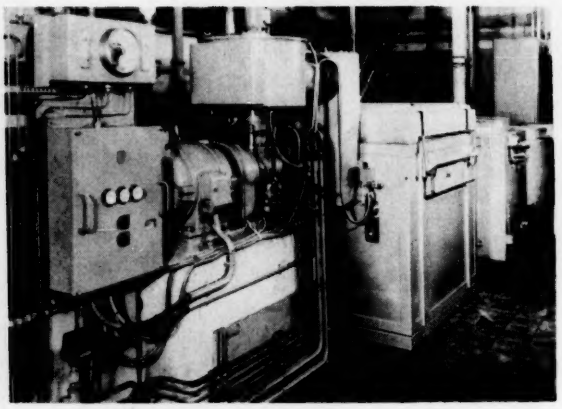

▶▶▶ULTRA LOW temperature equipment has attracted considerable interest in a series of shows held past Summer and early Fall. Applications of cryogenics in manufacturing, research and operating functions, have also been a number of paper topics presented at conferences, seminars and engineering meetings, not only in the United States but abroad. This field even attracted attention at the Brussels International Fair.

Although environmental equipment of all types and applications was displayed at the various exhibits, one of the top attractions appeared to be gas liquefiers. Compact newly designed apparatus produce liquid air, oxygen and nitrogen. They are used as an expendable refrigerant source for low temperature work in in laboratories and industrial plants. Further applications include supplying cold air or other gases at temperatures of minus 270F for cold chambers or environmental equipment, for recondensing gases, separation of gases, etc.

Novelty of Yesterday Lab Aid of Today

Liquid air, a few decades ago was classified strictly as a novelty. Most readers today will remember their science class demonstrations when the teacher used liquid air to freeze a rubber ball so hard that it splintered into many small pieces when dropped on the floor. Also, many adults today will remember the experiment where mercury was solidified on a wood handle to form a hammer which was used to drive nails into a plank.

Today, liquid air and liquid nitrogen are really in the realm of big business and the development of a new, small-size, low-cost gas liquefier becomes quite significant. Many processes require temperatures that range from minus 100 to minus 200 Centigrade (minus 148 to minus 328F), and most research laboratories and plants must keep liquefied gases on hand.

Industrial Applications

Sub-zero temperatures are needed for shrink-fit assembly, for stabilization of steel by transforming austenite to martensite, for quenching tool steel, for cooling cutting edges of machine tools, for calibration of gages, for testing metals and other materials, for removing water vapor in vacuum systems and from gases, and for speeding adsorption of nitrogen in zeolite crystals.

Liquid gas freezes plastics, drugs and spices into brittle cakes to facilitate and improve pulverization results. It is used in the manufacture of inflatable toys by sealing pellets impregnated with liquid gas between layers of plastic. Fatigue strength and hardness of stainless steel are increased by working the metal at low temperatures provided by liquid air. And liquid oxygen is used for fuel in rockets and guided missiles[1].

Liquefier Development Like Domestic Refrigerators

Large quantities of liquid air for industrial use are made by large compressors in mammoth plants where space is plentiful. The product is delivered to users in metal vacuum bottles at the time it is needed in order to minimize loss due to evaporation. This makes it expedient that the user should know his day-to-day requirements well in advance. Outside sources have another disadvantage because costly shutdowns may be experienced by the user if deliveries of liquid gas by the supplier are interrupted or delayed.

With the development of these packaged gas liquefiers, design engineers have accomplished a miracle of efficiency and compactness. The unit is only 37 inches long, 20 inches wide and 34 inches high. Yet, these units produce liquid air at the rate of 5 quarts per hour at the exact time needed. Even the smallest laboratory or plant can now produce temperatures which are extremely low—on an economical basis. Capital investment is less than $8,000 and cost-per-quart of liquid air is minimized since it reflects only operating service costs and negligible evaporation loss.

One U.S. industrial laboratory uses 200 quarts of liquid air per week. Market price ranges from 60c to $1.50 per quart. Using the minimum cost from an outside supplier, then, on an annual basis:

200 x $0.60 x 52 =

$6,240.00 per year.

Using a 5-year amortization plan, capital expense for one unit is about $1,800.00 annually, including interest. Add to this, $100.00 per month, energy and operating costs. Total yearly expense is nearly $3,000.00.

Dutch Designed Unit

Assuming the package unit operates 40 hours per week, it will produce 10,400 quarts of liquid air in a year at a cost of roughly 29 cents per quart. Obviously, after the 5-year amortization period, the cost per quart will be about 12 cents because capital investment charges will be eliminated. Similarly the cost per quart will drop if production schedules are increased to higher levels than 200 quarts per week.

One such liquefier unit which has received considerable attention is the Norelco generator marketed by the Instrument Division, Phillips Electronics, Inc. The device was developed by the N. V. Philips Gloeilam-

Gas Liquefiers

Self-Contained Units, Becoming Popular- More Widely Used By Industry, Researchers

Subject photos at left show a typical laboratory installation of an environmental test refrigerator and a Norelco gas liquefier.

penfabrieken Research Laboratories in Eindhoven, Holland. The Arthur D. Little Co. became the distributor for the Dutch machine in April 1956 under a license agreement which allows ADL to modify the machine for special application that may be needed by their clients.

A fully automized Norelco liquid nitrogen generator was displayed and demonstrated for the first time at the ASTM exhibit late in June. On July 1, Philips Research Laboratory at Eindhoven were honored with the Kamerlingh Onnes Gold Medal for 1958, according to Pieter van den Berg, President, North American Philips Company, Inc., New York. Professor Kamerlingh Onnes was the first man to produce liquid helium at Leiden in 1908 and the Netherlands Society of Gas Liquefiers celebrates the 60th anniversary of the event this year.

The award to Philips recognizes the company's achievement in developing a new gas liquefier judged to be: 1) The first efficient and reliable self-contained unit ever developed, 2) Higher in efficiency than all other cooling units of its class. The award also cites the fact that the Philips machine can operate almost continuously to meet the needs of a wide variety of applications.

Technical Presentations

This machine and others were also displayed at: Electron Microscope Society of America, Los Angeles, August 7-9; Instrument-Automation Conference & Exhibit, Philadelphia, September 15-19; National Metal Exposition, Cleveland, October 27-31. Typical of these units is the machine shown in Fig. 1, page 10.

Two technical papers presented at the Cryogenic Engineering Conference at Massachusetts Institute of Technology, Cambridge, September 3-5 dealt with gas liquefiers. Joseph Meisler, technical-commercial manager, Cryogenics Department, Philips Electronics, Inc. was the speaker. The first paper presented at the Session on Cryogenic Equipment was entitled "Ultra Low Temperature Production and Control in Environmental Testing and Application Facilities". The second paper presented at the Session on Cryogenic Applications was entitled "Applications and Economics of the Norelco Gas Liquefier for Recovery of Flash Gases".

The equipment paper covered an extension of the present Norelco gas liquefier to allow production and accurate control of ultra low temperatures by means of a circulating cold gas stream. It also explained how temperatures from minus 20 F to lows of minus 260 F are obtained through an unusual method of controlling the compression ratio in the Norelco engine. Data shows how capacities up to 1½ kilowatts of refrigeration at these low temperatures are obtained efficiently for applications in chemical, metallurgical and allied fields.

Typical Applications

The application paper dealt with design modifications to the original Norelco gas liquefier to provide a compact, efficient recondenser of flash gases from liquid storage systems. It explained recovery of hazardous gases handled by chemical and "exotic" fuel producers, gases from low boiling hydrocarbon liquids, and liquefied atmospheric gases. Data shows attractive recovery economics on typical applications.

First special application of the Norelco gas liquefier by A. D. Little, Inc. was that of modifying it for use by Continental Oil Co. The initial test was successful except for frequent plugging of the unit by impurities in the gas stream. The plugging was caused by carbon dioxide, present in Cambridge in amounts of ten times that expected in the gas available to Continental Research Laboratories at Ponca City, Oklahoma. The liquefier has been used by Continental, not only to supply researchers with liquefied natural gas but liquid ethylene, as well.

The USN Bureau of Ships was interested in a liquefier for shipboard use, because of its compactness and ease of operation. However, a number of basic questions had to be answered before the Navy would consider use of a modified unit on board ship. ADL constructed a tilting device (and a special calorimeter to be used with the gas liquefier) which stimulated pitch and roll. At the conclusion of that project the unit was shipped to the Engineering Experiment Station at Annapolis.

According to THE LITTLE ACORN, a publication by Arthur D. Little, Inc., that firm has since been involved in two military projects where the gas liquefier has been involved. One was a modification of two gas liquefiers to recondense liquid nitrogen used as a heat shield for a liquid fluorine tank. The tank and modified generator units are installed in a van for use by the Army Ballistic Missile Agency to supply liquid fluorine for missile fuel.

The second application involved the use of a modified liquefier to freeze carbon dioxide out of air in submarines, a purification job presently accomplished with extremely bulky chemical equipment.

ADL has another project now in the design stage which calls for a modified gas liquefier to recover and purify the helium used as an inert atmosphere in a manufacturing process. They are also planning modifications to provide refrigeration at minus 150F; one for use in freeze-

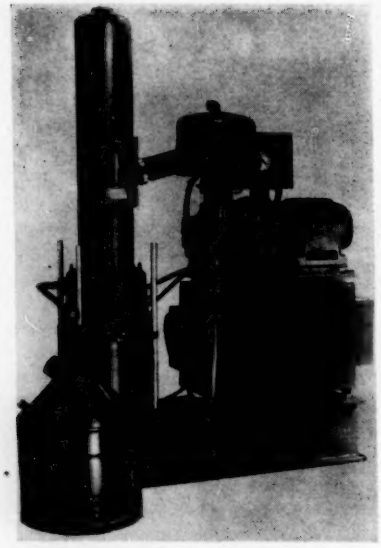

Fig: 1—Liquid nitrogen generator. Basic liquid air machine is the motor driven pump on the right, the nitrogen column is at the left.

drying in a special coating process, the other for the liquefaction of a new hydrocarbon compound.

Other projects discussed and pointing toward future applications are the recovery and purification of welding gases, the removal of radioactive contaminants from nuclear reactor purge streams, refrigeration supply for "freeze" valves, and the development of a column for oxygen.

Operating Principles

Operating cycle of the Norelco gas liquefier involves four phases. A schematic and diagrammatic representation of the process is shown in Fig. 2. The piston and displacer positions of the liquefier engine are shown in the reverse cuts.

In phase 1 the medium is in the compression chamber where it is compressed by the piston. The displacer which is positioned above the piston moves downward in phase 2 to drive the medium from the compression area to the expansion chamber through the cooler, the lower jacketed area around the displacer cylinder. In the cooler, heat generated by compression is absorbed by circulating water. The medium next passes through the regenerator, the jacket area next above the cooler, where further cooling occurs.

The medium then passes to the head or "freezer". Most of the medium is now in the expansion chamber. The temperature of the medium is further reduced in phase 3 by the expansion resulting from the combined downward movement of both the main piston and the displacer.

The cold medium is driven back to the compression chamber by the displacer in phase 4. During this phase, heat is removed from the freezer head. In passing back to the compression chamber the medium absorbs the heat stored in the regenerator during the second phase.

Machine Details

Figure 3 is a cross-section through the gas liquefier. Operation of the machine is as follows:

Piston (1) rides in cylinder (2). Displacer (3) causes a periodic flow of gas coolant back and forth between spaces (4) and (5). This gas goes through the annular exchangers surrounding the displacer. Parallel connecting rods (6) couple the piston cranks (7), of the crankshaft (8) with piston (1).

Displacer rod (9) is linked to connecting rod (10) and crank (11) of the crankshaft (8). Port (12), cooler (13) and regenerator (14) connect the compression area with the head or "freezer" (15). Displacer piston (16) contains insulation (17). Condenser (18) is the surface upon which the gas becomes liquefied. Annular channel (19), tapping pipe (20), liquid draw-off.

Insulation (21) surrounds plates, past which incoming gas flows, within the outer enclosure (22). Gas inlet (23). Plates of the ice separator (24) are joined by the tubular structure (25) to the top of the head (15). Gas-tight shaft seal prevents medium loss (26). Cylinder supplying gas medium (27). Medium supply pipe (28) with one-way valve (29). Driving motor (30).

[1]Refrigeration's Role in Missles, by Fred Herr; INDUSTRIAL REFRIGERATION, August 1958, page 26.

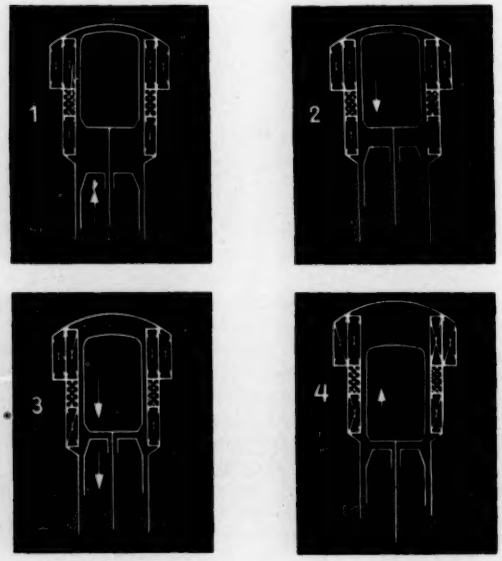

Fig. 2—Above, four phases in the gas liquefying cycle. Each phase shows the position of the gas displacer and piston, relative to each other and cylinder limits.

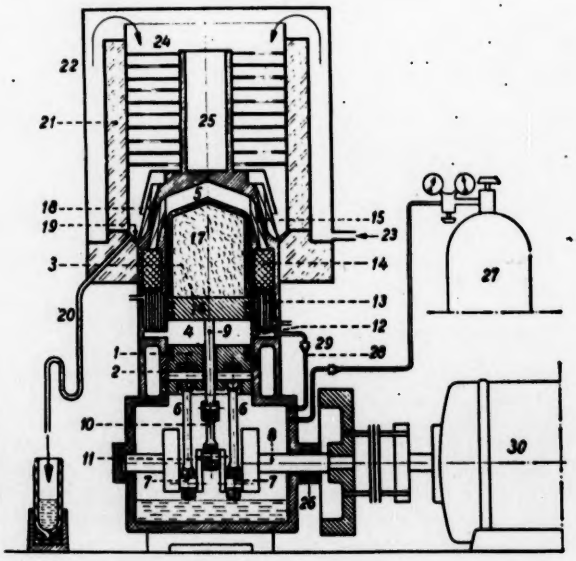

Fig. 3—Patent drawing showing principal parts and functions of the gas liquefier. Text gives description of each numbered item in the figure.

In Vacuo

Sub-Atmospheric Pressures Improved By Refrigeration

▶▶▶MORE AND MORE industrial processing requires a high vacuum. Almost complete removal of air is essential in the manufacture of radio and television tubes, some pharmaceuticals and specialty metals, and the now familiar particle accelerators used in nuclear research. At very low pressures (high vacuums) there are very few molecules present to contaminate materials being processed, or to interfere with the orderly flow of particles—as, for instance, electrons flowing to the screen of a television picture tube.

Pumps that could produce a partial vacuum were developed by Boyle and vonGuericke in the 17th Century, but high vacuum technology did not develop fully until the 1930's when vacuum "in quantity" became available to the mass producers of blood plasma and certain antibiotics. Now the market of high vacuum equipment exceeds $20 million dollars per year. One of the more recent applications of high vacuum is in simulating the conditions met in outer space[1,2] as an aid to studying the behaviour of new metals and other materials for missiles and satellites.

Natural Vacuums

The quality of a vacuum is measured in terms of pressure. At sea level, air pressure is 14.7 pounds per square inch, or—in terms of the height of a column of mercury this pressure will sustain in a barometer tube—about 30 inches (or 760 millimeters) of mercury. At the turn of the century, vacuum pumps could draw down to pressures equivalent to tenths of a millimeter of mercury —thousandths of a pound. Today's vacuum pumps may go as low as 1/10,000,000 millimeters of mercury; vacuum measuring devices are accurate to as low as 1/1,000,000,000,000 millimeters.

Another way of describing a vacuum is to note how far above the earth's surface the vacuum exists naturally. Humans cannot survive without special equipment more than 5 miles above the surface. Biologicals are dehydrated under vacuum conditions similar to those existing at an altitude of 60 miles, and lenses are coated at 100 miles. Going even higher, particle accelerators duplicate the vacuum that prevails at an altitude of 200 miles and an oil vacuum pump that at 250 miles.

Mechanical Vacuums

A modern vacuum system combines a mechanical pump, which starts the evacuation process, and a non-mechanical high vacuum stage that take over beyond the limits of mechanical pumping. The conventional high vacuum device is an oil diffusion pump, in which a jet of oil vapor drives remaining molecules toward an outlet, compressing them so that they can be drawn off by the mechanical pump. With such a two-stage system, pressures can be brought down to less than one-thousandth of the value obtained by even the best mechanical pump working alone. The vacuum chamber to be evacuated may be a metallurgical furnace, a still, an evaporator, or an electron tube.

Evaporion Pump

The most recently developed high vacuum pump—now used in connection with some of the large particle accelerators—is the "Evaporion" pump. Following an entirely new technique, titanium is evaporated and sprayed into the pump, where it entraps the gas molecules by virtue of its unusual affinity for atmospheric gases. (Copper foil is another good "getter" for residual gas). The titanium molecules and the outer case of the pump are electrically charged; thus the molecules are attracted and held to the pump's casing, effectively removing the gases from the system. The particular advantage of the evaporion pump is that it creates a "dry" vacuum—everything is removed except the inert gases such as argon and helium. By contrast, an oil diffusion pump always permits a small amount of oil to travel back into the vacuum system, where it remains. The evaporion pump is expected to be used to produce very high and very clean vacuums for special electron tubes.

Vacuums Perfected By Low Temp Refrigeration

An even newer suggestion is to use liquid helium temperatures to produce a very high and very dry vacuum. A baffle or cold plate[3], refrigerated with liquid helium, would be exposed in the chamber to be evacuated; nearly all the residual gas molecules in the chamber should be condensed and "frozen out" on the cold surface. The technique has not yet been applied on a practical scale (other than above 32F), but the same approach has been used experimentally to trap and retain the transitory free radicals generated in chemical reactions.

The vacuum furnace, where metal is melted and cast into ingots, is becoming routine in the production of certain kinds of steel and copper, molybdenum, titanium, zirconium and tantalum. High vacuum in these instances not only removes contaminating gases present in the surrounding atmosphere but also some undesirable gases which are dissolved in the metals. Nuclear research is another area where high vacuum equipment plays an important role; a fundamental requirement of particle accelerators such as the cyclotron[4] and bevatron is a high vacuum to provide complete freedom of movement for the nuclear particles.

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[1]Inyorken Test Center Produces Climatic Changes at Rocket Speeds, INDUSTRIAL REFRIGERATION, January 1958.

[2]In National Defense – Refrigeration Also Serves, INDUSTRIAL REFRIGERATION, October 1958.

[3]One form of vacuum cooling similar to that described in New Jersey Vacuum Cooling Units, INDUSTRIAL REFRIGERATION, *November* 1958, employs the use of a cold plate for augmenting the vacuum. Direct expansion ammonia is used in some plants to freeze out water vapor, thus lowering the vacuum. For another type of vacuum coolers for produce, chilled ice water is circulated through a coil or plate for condensing out water vapor in the reduced atmosphere.

[4]Refrigeration also plays a part in cyclotron accelerators other than in the vacuum system. Such nuclear machines create considerable heat in operation, and require many tons of refrigeration to remove the heat efficiently and rapidly. See Cosmotron Cooling System, INDUSTRIAL REFRIGERATION, October '58, Page 27.

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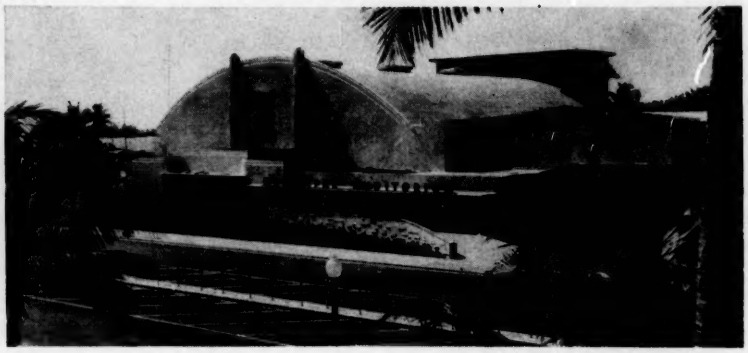
NAII MEETING FEATURES ECONOMIC AND PRODUCTION TOPICS

DR. GOODWIN
Speaker



President
R. C. MUCKERMAN

▶▶▶MARKETING will receive the principal emphasis at the various economic clinics and business sessions of the National Association of Ice Industries meeting to be held in Miami November 18-21. Production, processing and management clinics are also scheduled, receiving top notch billing. President Richard C. "Dick" Muckerman looks forward to an unusually large and fine convention because of the prominent figures who are featured speakers or moderators of the various sessions and clinics.

The meeting will be held at the Miami Municipal Auditorium pictured above, with respective material and state headquarters at the Biscayne Terrace and Hotel Everglades. Congressman Robert L. F. "Bob" Sikes, Florida, will speak to the first session of the convention. Dr. Rowland F. Kirks, Legislative Counsel of the National Automobile Association, will speak to the third session, and Dr. Frank Goodwin, Professor of Marketing, University of Florida, will close the convention.

Sessions Extraordinary

The two big clinic sessions will be on Wednesday and Friday. George W. Heath, Oscar Mayer Ice Service, Madison, Wisconsin, will moderate the marketing clinic on Wednesday, while E. L. (Pop) Gunn, Jr., American Service Co. of Atlanta, Ga. will lead the production, processing and management clinic on Friday. Working with these two moderators will be ten of the nation's outstanding ice men who will introduce a thought provoking topic and each session will then be turned into a round table discussion.

Sikes Addresses Opening

First speaker at the NAII Annual Meeting will be Congressman Robert L. F. "Bob" Sikes. Sikes went to Congress at the age of 33 and is now the senior member of the Florida delegation, re-elected bi-annually since 1940. He was re-elected to the 86th Congress which convenes in January, without opposition. The Ice Association is billing Sikes as a friend of the businessman and an advocate of small business.

Sikes has served on the House Committee on Foreign Affairs, the House Armed Services Committee, and is now on the House Appropriations Committee. He is also a member of the Defense, State Department, and Military Construction Sub-committees. Valuable legislation has been attributed to the service of this Congressman who will actually close the Tuesday session, being proceeded on the program by the ice industry officers with their annual reports.

Marketing Clinic Features Heath and Gunn

Wednesday's session will be given over to talking shop. Ice marketing problems and opportunities are to be discussed with other ice men. George W. Heath, member of NARW's Research and Marketing Committee will moderate this clinic.

The moderator of the Production, Processing and Management Clinic is the Association's immediate past president E. L. Gunn, Jr. That clinic will take place on Friday and will explore ideas and developments in the industrial and commercial ice making business.

Rowland F. Kirks, the featured speaker of the Thursday session is the former Dean and President of National University, and Assistant Attorney General of the United States; considered one of Washington's top-notch legislative personalities. He will present an analysis of what the trade association can do to protect its members through legal and legislative activities. Kirk's vast experience has given him a comprehensive understanding of legislative forces as they relate to business and government. He is recognized as an important guiding force in forming legislative viewpoint of trade associations around the nation.

Goodwin Will Close

Billed as a super-salesman, the prominent speaker, writer and college professor, Dr. Frank Goodwin will close this year's NAII convention. Goodwin has been with the University of Florida, teaching sales and sales management courses since 1947. Said to be a great platform personality, he has addressed audiences of over a quarter of a million persons in over 40 of the United States, Mexico and Canada. Over 60 articles are attributed to him, the most recent prominent items appearing in SUPER MARKET MERCHANDISING.

Dick Muckerman, in his opening address to the convention will set the stage for this impressive speaker group and the new type forums. Under his leadership, it is reported, some important new members will be introduced, and a plan for improving NARW's financial structure has been worked out; and, the Association's constitution and by-laws, completely revised will be presented for approval.

DIAMOND ANNIVERSARY For MIDWEST SAUSAGE MAKER

PRECEDING THE American Meat Institute Meeting at Chicago late in September, considerable publicity brought out the fact that Oscar Mayer & Company was celebrating its 75th year—a diamond jubilee. At the time a well known feature writer was commenting on the fact that Carl Sandburg's title "Hog Butcher of the World" bestowed on Chicago some years ago, no longer fit the city. Other feature writers were confirming the transition of the times in the publication of the Oscar Mayer story. The Oscar Mayer organization, although originating in Chicago, is by no means centralized in one large packing center as had been the tradition of the larger packers for half a century.

Oscar Mayer & Company ranks ninth in dollar sales among the more more than 5,000 meat processors in the United States, employs about 8,400 persons and processes upwards of 600 million pounds of meat per year. Established in 1883, Oscar Mayer & Co. has come into its ascendancy largely since World War II. Between 1946 and 1957 Mayer sales increased from $81,633,000 to over $246,255,000.

It is no coincidence that during this same period the company's investment in new plants, equipment and special production machinery rose from $10,336,000 to $46,339,000. Since initial acquisition of Wisconsin facilities, the company has increased its holdings and improved existing facilities with exceptional creativity.

The firm has in addition to its Chicago and Madison facilites, plants at Davenport, Iowa, Philadelphia, Pa., Los Angeles and Atlanta, Ga.

Family Operation

"Sausages Sprout On a Family Tree" was the headline offered by feature writer Nicholas Shuman to the Oscar Mayer story as prepared for the *Chicago Daily News* and wire services. It was a very appropriate and apt title since, son, grandsons and grandnephews have succeeded the original founder in the management and operation of this firm which specialized in sausages, breakfast and luncheon meats.

Oscar F. Mayer, a Bavarian immigrant opened his first butcher shop in 1883 in Chicago. Five years later with the help of his brothers, Max and Gottfried of Germany, he opened a larger establishment at 1241 Sedgwick, where the main Chicago plant is still located.

Oscar G. Mayer, son of the founder, who is credited with the mechanization of this sausage making enterprise, has trained three sons who are currently company executives. Oscar G. Jr., president, directs the company's activities for his father. Harold M. is vice-president and manager of the Chicago plant and Allan C. is vice-president of foreign operations. Two sons of Gottfried Mayer are in executive vice-president and advertising vice-president positions. They are Gottfried O., the executive, and Carl G., the public relations and advertising director.

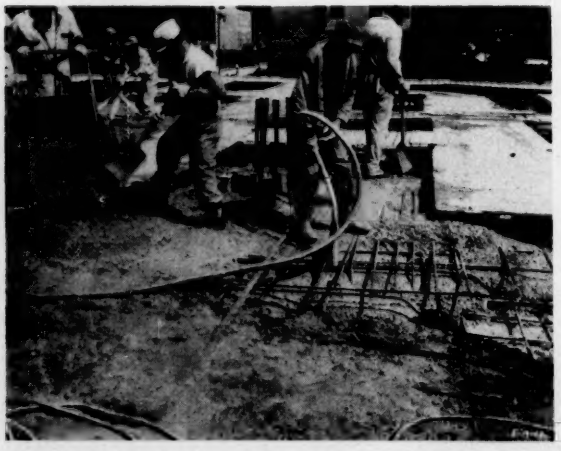
Mechanization, Automation Backs Sales Expansion

Spending in 10 years nearly 4½ times the Company's immediate postwar machinery investment has been necessary to quadruple gross sales in a like period of time. The science and technology interest of Oscar G. Mayer has been passed on to the present generation from all appearances. Fascinated by machinery, Oscar G. Mayer invented some equipment himself, bringing about formation of a subsidiary company which manufactures processing and packaging equipment invented by the company's researchers. Although pioneering some if its own methods, the company does not hesitate to use other processing machinery, modern material handling methods and improved refrigerating products to obtain a high degree of efficiency. Modern methods of insulating coolers and other refrigerated areas had important roles also.

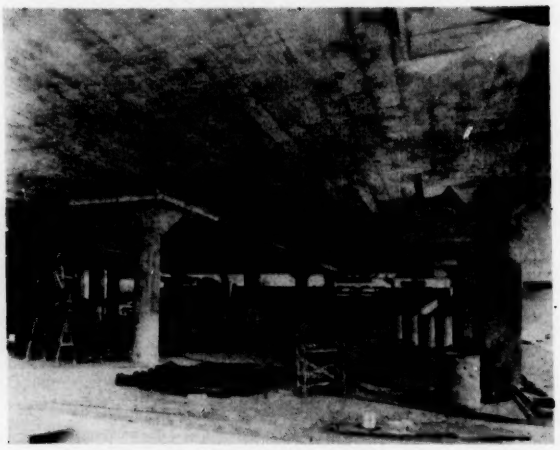
Insulation and Refrigeration Equipment Installation at Chicago

1. Start of a permanent insulated roof requires placing of the foam polystyrene insulation over the concrete form boards. Joints are broken with respect to one another.

2. Reinforcing bars and formed rods are placed over the insulation in accordance with structural engineering detail. Insulation carries steel without deformity.

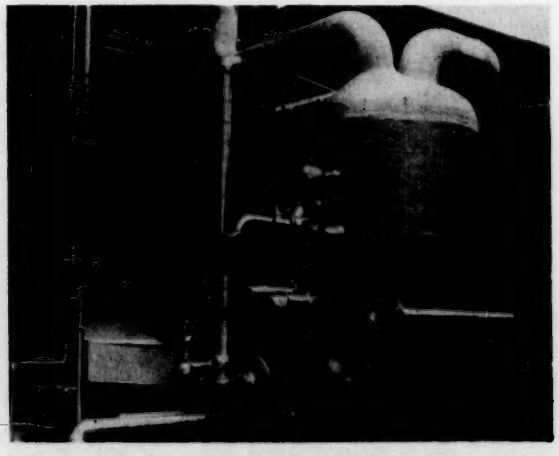


3. With the reinforcing wired in place, pre-mixed concrete is poured directly over the insulation and worked to the proper thickness and consistency with pneumatic tools.



4. View from the underside of the insulated roof deck which carried the styrofoam in forms. In this view the forms have been stripped and the insulation is visible.

5. Another segment of the same room shown in 4 with the Fire-Ban finish applied to the styrofoam surface. This construction took place in the Oscar Mayer Chicago plant.



6. Dual liquid return system installed at Oscar Mayer, Chicago plant over an alley-way. This Phillips system handles an 800 TR plant, improving the overall efficiency.

Mayer Celebrates by Expanding, Altering and Modernizing Facilities

Madison Modernization Employs Unique Ductwork

Installation of mechanical type liquid recirculation pumps for improved refrigeration efficiency in coolers and freezers in 1957, involved a certain amount of duct and pipe systems at the Madison, Wisconsin plant. Additional duct was provided in connection with cutting rooms, bacon slicing and wrapping, and refrigerated shipping areas. Styrofoam was selected for the duct construction.

Thinking of those responsible for this selection was that the material, an impervious form of polystyrene would eliminate the problem of water absorption in these areas of high humidity. Further there was no decay and in addition to having a very low heat conducting factor, the material was neat looking when cut to conform to the shape and path of complex duct work.

The material used was a minimum of one-inch thick, boardform from which the air ducts were constructed. Actually no metal was used, the insulation forming the duct in the high humidity cutting and meat working rooms. Aluminum or galvanized iron ducting, it was explained, costs less and has lower resistance to air flow. However, condensation will occur on the metal surface and would eventually result in dripping on the product.

The specific use of insulation formed ducts is for distribution of air in the cutting rooms. Actually, air at 27 to 33F supplied from air units to the rooms seemed to bother personnel. Therefore the insulation formed system was used. A few diffusers, a few grilles, and many holes cut into the polystyrene duct distribute the air, eliminating strong drafts. The cutting rooms are large and very humid, usually at 32 to 38 F. The ducts usually vary from 50 to 125 ft. in length and range in cross section from 36x18-in. down to smaller capacity ducts which pinpoint distribution at specific points in the room.

Cold Storage Facilities

Refrigerated areas added in 1957, among some of the structural work accomplished, included a bacon chiller of approximately 2,000 sq. ft. floor area and a small experimental room. The bacon chiller was designed to operate at 0F while the experimental department operates at minus 80F. The research room is insulated with several layers of polystyrene on the walls, floor and ceiling. Total thickness is eight inches.

Oscar Mayer Expands Machinery Subsidiary

▶▶▶ LATE IN OCTOBER it was announced at Chicago that Oscar Mayer & Company's wholly owned subsidiary Kartridg-Pak Machine Co. had acquired two other Chicago firms. The purchase price of Monjonnier Associates Inc. and Monjonnier-Dawson Co. was not disclosed. Both are under the same management and will be operated as a consolidated division of Kartridg-Pak. Monjonnier Associates manufactures aerosol filling machines and Monjonnier-Dawson, produces a line of dairy equipment.

The bacon chiller has the same foamed plastic on the ceiling, and the exposed surfaces are finished with Fire-Ban. Other rooms converted to cold storage or remodeled, in which this expanded polystyrene material was used for insulation, were the minus 30F blast freezer and a subzero storage area. Ceilings in the cutting and working areas are also finished with this material to reduce condensation which had been occurring on them. The same finish material was placed on the exposed surfaces of the insulation.

Machinery Expansion

Another large expansion is the current installation of an ammonia centrifugal type refrigeration compressor which is to be driven with a steam turbine, 450 lbs. gage full condensing.

Capacity of the new compressor is 1500 TR at approximately 0°F. This new machine will operate on basic load for the entire plant, with present equipment supplementing for additional and varying capacity. This new compressor and appurtenant apparatus was manufactured by York Division of Borg-Warner. A new Marley cooling tower is being installed as part of the new equipment.

Chicago Expansion

A major expansion of the Chicago plant of Oscar Mayer was completed late in 1957. In the 35F cooler 60,000 sq. ft. of polystyrene was used for ceiling insulation. The construction technique employed was to place the insulation in the concrete forms. The polystyrene was laid over the lower forms for the entire ceiling or roof area. A reinforced grid was placed above that and concrete poured directly on top. When the wood forms were removed from beneath, the finish was applied to the surface.

In 1957, the floor for a new blast freezer and beef storage was insulated with eight and six inches of the same plastic material, respectively. Here the insulation was placed on top of a concrete subfloor and the finished concrete floor was poured directly on the insulation.

Liquid Return System

Mounting an accumulator on I-beams spanning an alley increased gravity head in the Chicago plant by four times and doubled its return capacity. Two parallel traps in a Type A Phillips Liquid Return System, moves about 40 gpm of liquid in this 800 TR plant. Plant efficiency improved many-fold.

As the liquid refrigerant separates out of the suction gas in the accumulator pictured, it flows through a check valve into the liquid traps. The traps are vented to the accumulaor through a 3-way valve. When one of the traps fills with liquid a float switch is actuated. This energizes the 3-way valve which closes the vent. It also opens a high pressure line between the trap and the compressor discharge line.

As pressure builds up in the trap it closes the check valve between the accumulator and the trap. The trap equalizes with the high pressure receiver and the liquid drains from the trap to the receiver by gravity through a second check valve. As the liquid trap empties, the float switch de-energizes the 3-way valve.

De-energizing causes the accumulator-to-trap line to re-open and the high pressure trap-to-compressor discharge line to close. Now that the trap is vented back to the low-side accumulator, the second check valve closes and the first check valve opens allowing liquid to again drain from the accumulator to the trap. The second trap at the Chicago installation alternates with the first one.

Iowa Operations

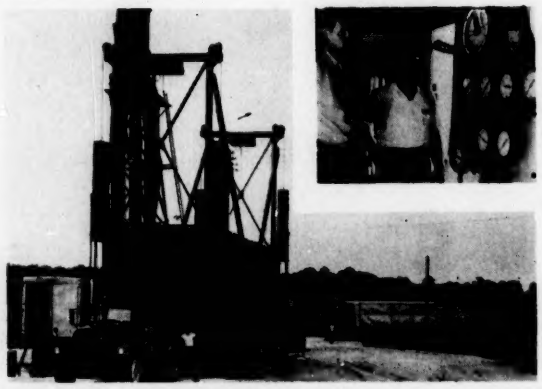
The Davenport, Iowa plant was acquired in 1946. Expansion and modernization took place in 1955 and '56. A freezer building was constructed, and a hog chiller was installed. Penthouses for housing refrigeration equipment were erected and insulated. The offal cooler was also insulated. In addition to the ceilings, columns and beams were insulated in two 3-in. layers of Styrofoam surface-

(Continued on Page 36)

Crisp Lettuce With New Jersey's Vacuum Cooling Units

Four portable vacuum coolers are operated outside New Jersey following the lettuce harvest migration, thus getting the most out of the capital investment as well as putting more quality product on the consumers table at less cost. *—Photo Courtesy Great Meadows Corp.*

—Other photos Courtesy Farm Service News, Department of Agriculture, State of New Jersey.



Largest vacuum cooling unit East of Arizona is this installation which can accommodate semi-trailers of 600 crate capacity. This unit is located at the Cedarville Cooperative Marketing Association, Inc., in New Jersey.

Inset, above, Joseph Kuriami, engineer, and auction master John G. Nardelli, check instrument readings on a panel board at the Cedarville vacuum cooler.

Eastern Co-ops Utilize Vapor Cooling; West Bulk Hydro-Cools Fruit

▶▶▶ SOUTHWESTERN states of California, Arizona and Texas can no longer lay claim to titles of being the only states with vacuum cooling enterprises. New Jersey now has one permanent and four portable vacuum cooling units for lettuce cooling. The FARM SERVICE NEWS issued by the New Jersey Department of Agriculture, in September reported that there was a good chance that the lettuce purchased by housewives in New Jersey last Spring, was probably vacuum cooled. That department estimates a large proportion of the Fall crop is to be processed through vacuum coolers from New Jersey's lettuce production areas.

Portables Follow Harvest

Largest unit yet in the state (pictured above) is located at Cedarville Cooperative Marketing Association, Inc. The State Aggie department reported that smaller portable units were stationed at the Alantic County Market Growers Cooperative Association, Inc., Cologne; the Landisville Fruit Growers Cooperative Association, Inc., and the Great Meadows Vegetable Growers Cooperative Association, Inc. The New Jersey vegetable cooling units utilize steam ejectors and electric driven vacuum pumps for producing the chamber sub-atmospheres.

The Cedarville vacuum cooler is operated by two steam jets which required 1250 gpm of water supplied by a pond adjacent to the cooler site. The vacuum chamber is 46 x12x14-ft high. As the figure indicates, the chamber will accommodate loaded refrigerator semi-trailers. Lettuce is delivered from the field at approximately 90F. These semi's contain 500 to 600 24-head crates. The Department reports 30 minutes is required to cool the lettuce to 36F.

Rolled in one end and out the other in much the same way that the railroad cars are rolled in and out of the Crystal Ice & Cold Storage Co. Div. of City Products Corp. unit at Phoenix, the semi's are sealed and a certificate of vacuum cooling issued to the driver. The truck refrigerating unit begins operating and the lettuce is on its way to market.

The portable coolers are used in other states than New Jersey. As the crop season progresses they are shipped from one lettuce producing area to another. They operate on the same principal as the larger stationary unit at Cedarville but are not capable of doing as an efficient job. Being portable, they can only handle about half as many crates at one time. Although conveyors are generally used to move the product to and from the coolers, a considerable amount of hand labor is involved.

Bulk Peach Cooling Hastens Quality Harvest

▶▶▶ ICE NEWS, publication of NAII, in September described improvement to experimental handling methods in moving California clingstone peach crop to the consumer. According to this report, lug boxes will be outmoded. Foam rubber lined chutes will be used with a water vehicle to not only speed up fruit movement, but also to avoid bruising.

Bins which hold from 22 to 30 lugs convey the fruit through giant hydrocoolers which will reduce the temperature of the fruit to 45 F. Thus far hydrocoolers have been portable but it appears that permanent installations are about to make their appearance, according to Millard W. Young, president, National Ice and Cold Storage Co. of California. Expendable, low cost water ice provides the seasonal refrigerating effect.

Southwestern Ice Moves

▶▶▶ LATE IN OCTOBER Southwestern Ice Manufacturers' Association notified its members and friends in the industry that it had moved from its former location. It is now located at 720 Adolphus Tower, Dallas 2, Texas. The phone number remains the same, Riverside 1-5862.

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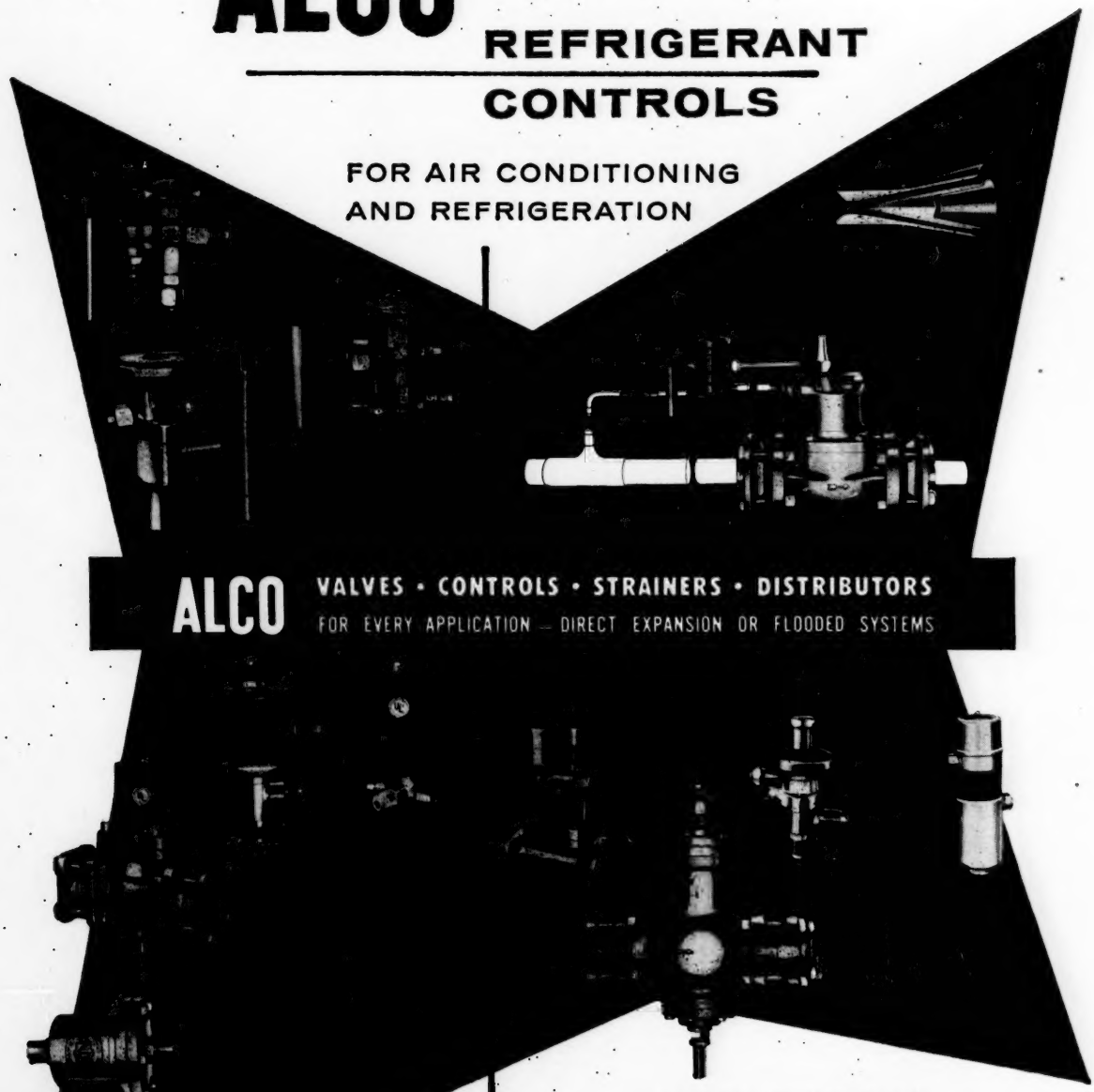

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SUPERVISION AND TRAINING — THE CHIEF'S RESPONSIBILITY

Theme of the 49th Annual Meeting of NAPRE

▶▶▶ REPRESENTATIVES of a number of management groups from such industries as refrigerated warehouses, breweries, hospitals and institutions have from time to time advised the NAPRE Board of Directors that its program did not provide sufficient material for chief engineers and their assistants. President Frank Chase, NAPRE, has taken the spokesmen at their word. While he considered the suggestions of NAPRE's Educational Committee with regard to other topics, he set the over-all theme for the 49th Annual Meeting, to be held at Miami Beach, Florida, Tuesday thru Thursday November 11-13th, as indicated in the headlines above.

Supervision and training are the chief engineer's job. By supervision, Chase explained, he was not thinking only of machinery and equipment supervision, but close supervision of personnel, as well. And, supervision includes training of engineers. NAPRE's National President left no doubt that training included not only proficiency in an engineer's current task or assignment, but also the development of leadership and education for the job ahead. The ultimate aim of every engineer should be the chief engineer's job.

Six Educational Sessions

Educational program for the 49th meeting includes a half dozen sessions, ranging from erection and installation topics to the supervising engineer's job. Each specializes in one particular aspect. For example, the second educational session deals with operating procedures; the third, with plant applications; the fourth, with supervision; the sixth, with maintenance.

Pay Attention To Details

The first educational session, scheduled for late Tuesday morning, features Wallace M. Smith of General Chemical Div., Allied Chemical Corp. Smith will dwell on the importance of little things in the proper installation of the central station air conditioning plants. As an example, he will cite the case history of a plant failure due to improper moisture evacuation during construction.

Tuesday afternoon educational sessions will feature M. E. Nicklin, Witte Engine Works, Oil Well Supply Division, United States Steel Corp. Nicklin deals with a currently popular topic—the transportation of refrigerated perishables. He will describe the design, operation and maintenance of dependable Diesel power for mechanically refrigerated railroad cars.

Purging Debate

The Question Box in INDUSTRIAL REFRIGERATION prompted the next two presentations. Members of the Association and other refrigeration engineers have wrangled for years over the operational procedures of purging. T. H. Rea of Armstrong Machine Works will discuss proper purging points. He will be followed by Dan Wile of Recold Corporation, who will discuss purging with a purpose.

Probably not satisfied with leaving well enough alone, Wile will, in the latter half of his presentation, dwell on oil removal. Early reports indicate that the opening of this additional topic will probably bring on a demand for a full fledged discussion of designs, as well as system operation and maintenance problems brought about by oil presence, at the 50th meeting of NAPRE.

Field Trips

Members of NAPRE will not take a postman's or busman's holiday, but a typical engineer's holiday on Wednesday. Their "rope yarn Sunday" will be opened with a field trip to the Velda Corp. plant at Uleta. Here they will examine and see in operation a triple-staged ammonia plant used for this multi-production milk products and ice cream plant. A second unique feature of this plant is the installation of two FES continuous package freezers. The original installation was the first in the United States. The second was completed just this year.

That evening, the ladies will join the engineers for a second tour—a visit to the Royal Castle meat commissary and bakery plant. This installation has three separate refrigeration systems, all halocarbon refrigerant types. One plant serves the meat facilities and another the air conditioning of the headquarters offices. The third installation actually consists of many individual systems. There are approximately a half-dozen, each using its own self-contained system, ranging from a few tons to nearly eighty, but all condensing with a common air condenser on the roof. These applications are all in connection with the bakery. Proof boxes, yeast storage rooms, dough retarders and air conditioning of the bakery all require refrigeration.

Mid-day Program

Unique this year is a mid-week combination presentation and educational session. New Industrial Members of NAPRE will be presented with their Certificates at a luncheon on Wednesday noon. Nationally, Armstrong Cork Co. and York Division, Borg-Warner Corp. will be the two Sustaining members. Other Industrial Members attending the Convention will also be presented.

Customary Membership Trophies will be awarded. The Emerson Brandt Trophy will go to the chapter showing the best over-all effort. The larger chapter trophy is taken by the chapter showing the largest number of new members, and the smaller chapter trophy by the chapter showing the best percentage increase.

Woolrich Speaks

When the luncheon dishes are cleared away, members will relax over a good cigar, favorite pipe or other lesser vice and listen to an address by Professor W. R. Woolrich, recently retired as Dean of Engineering, University of Texas. Prof. Woolrich has over thirty-five years of continuous membership in NAPRE and will draw a comparison between what was expected of a Chief Engineer some thirty years ago, as compared with the technician the boss expects his Chief to be today. Prof. Woolrich will be enroute at that time to Paris, where he will attend a session of Commission 9, International Institute of Refrigeration. Commission 9 deals with Education.

(Continued on Page 38)

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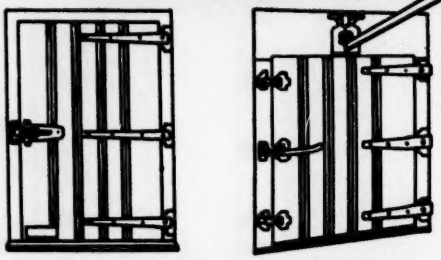
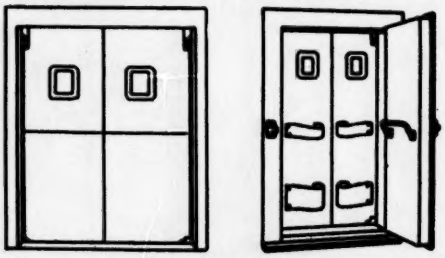


STANDARD COOLER-FREEZER DOORS



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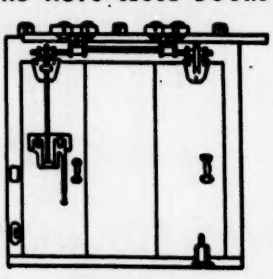

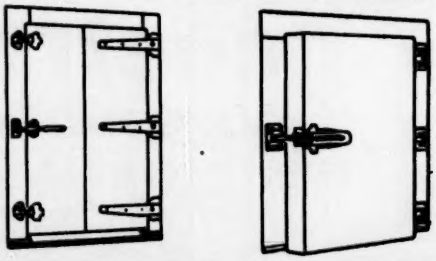

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Especially adaptable for smaller door openings.

THEY PERMIT

1. Safe passage of hand or power operated equipment with wider pallet loads.
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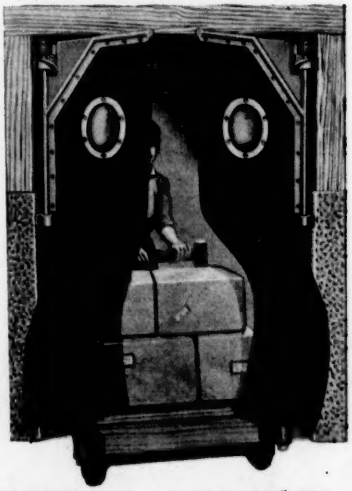

Model TSH battens are made of ¼" thick Neoprene (no grain) or of ¼" tough specially compounded rubber, reinforced with 2 layers of heavy cotton duck. Materials remain flexible even at extremely low temperatures.

Model TSH battens are furnished with No. 12 gauge galvanized steel jamb guards applied 4' 0" high with *no protrusions into the clear door opening.*

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Designed for wider and "straight traffic" doorways.

ADVANTAGES

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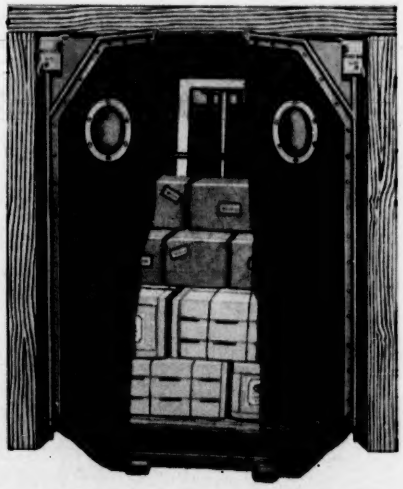

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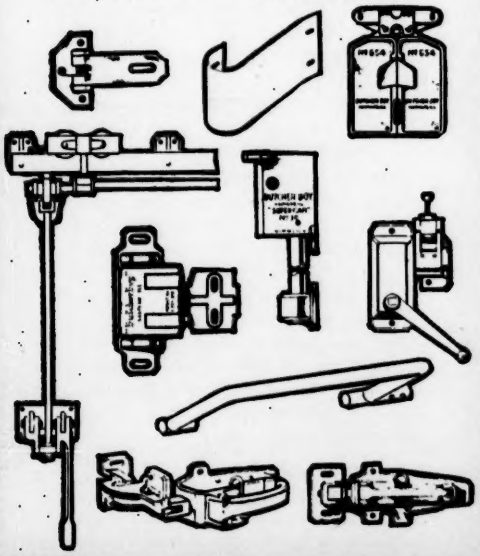


Seasonal Shutdown of the Single-Stage Hermetic Centrifugal

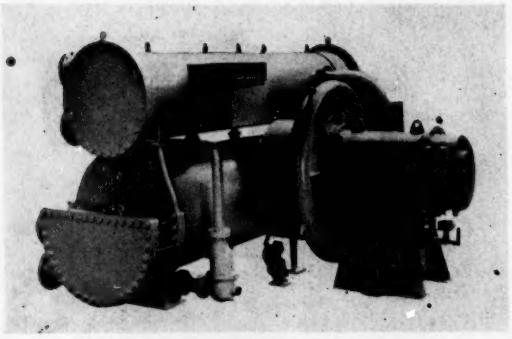


Fig. 1. Typical single-stage hermetic centrifugal installation consists of the apparatus such as pictured here.

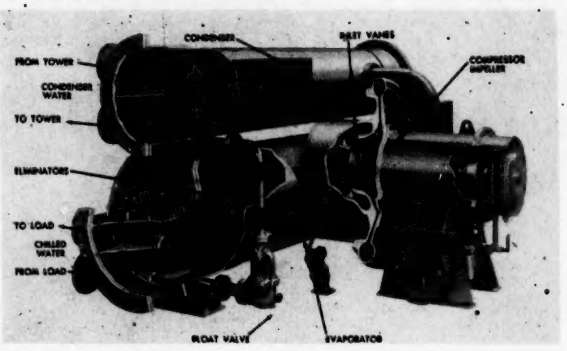


Fig. 2. Cut-away portions show internal arrangements of this type single-stage centrifugal condensing unit.

▶▶▶YEAR ROUND OPERATION of refrigerating plants for air conditioning is a realty in many installations. However, the majority of operations still follow the practice of a seasonal shutdown.

The NAPRE Educational Committee has been asked for an outline of procedures to be followed in shutdown of hermetically sealed centrifugal compressor-condenser-chiller units. In 1956, at the 47th Annual NAPRE Meeting in Detroit, Robert A. Loebl, manager, centrifugal compressor department, American Blower Div., American Standard, presented a paper on the operation and maintenance of *Tonrac* single-stage hermetic centrifugals. His paper since published as part of "Operation and Maintenance Instructions for American Blower Tonrac", is excerpted.

Basically, seasonal shutdown procedures for centrifugals applied to air conditioning apparatus, is somewhat alike between the various makes. The primary difference between the hermetic and the gear-and-seal type centrifugal compressor lies in the shaft seals of the latter which, of course, would involve additional instruction to engineering personnel making the shutdown. Regardless of make or type, it is best practice to follow the manufacturer's manual.

Unit Description

American Blower's compressor is a hermetic development which they have named *Tonrac*. Actually, *Tonrac* applies to the combined equipment pictured in Fig. 1, which produces the complete refrigerating effect. The combination unit has been designed to operate on completely automatic load control. It functions on the simple refrigeration cycle.

The four basic processes accomplished in the Tonrac unit are 1) gas compression, 2) constant pressure condensation, 3) throttled pressure reduction, 4) constant pressure evaporation. Basic cycle of operation is served by the four principal components illustrated in Figs. 1 and 2—the single-stage centrifugal compressor condenser, high side full throttling liquid return float valve, and the evaporator. Refrigerant is trichlorotrifluoroethane (commonly known as Refrigerant 113).

The single-stage compressor draws dry refrigerant gas from the evaporator through the inlet vanes for the purpose of raising the gas pressure. Compression is accomplished in a single impeller through centrifugal force and diffusion in the diffuser and volute of the compressor. Compression, of course, raises gas temperature as well.

As in most condensers, cooling water removes the combined heat of evaporation and compression, and the temperature of the gas drops to where the refrigerant liquefies. Condensed liquid refrigerant passes down through the liquid return line from the condenser to the evaporator. The high side float automatically feeds the condenser liquid and keeps the evaporator flooded. It also serves as a throttling valve to reduce the liquid from condenser pressure to evaporator pressure.

Water used for cooling and dehumidifying in air conditioning systems, or for cooling process fluids in industrial applications, is circulated through the tubes in the evaporator. Heat absorbed by the liquid refrigerant cools the water or fluid. Simultaneously the heat causes the liquid refrigerant to boil off into a gaseous state. The four phases described are taking place continuously.

Compressor

Tonrac in the 125 to 400 hp range is equipped with a single-stage centrifugal compressor designed for use with Refrigerant 113. Compressor operation is at a constant speed of 3550 rpm. Motor and compressor assembly comprises a completely sealed unit, cross-section of which is shown in Fig. 3. Compressor impeller, statically and dynamically balanced, is shrunk on and keyed directly to the motor shaft. The only moving part in this assembly is the motor rotor with the attached compressor impeller.

Lubrication System

Motor rotor-impeller is supported on two sleeve bearings (see again Fig. 3). A double Kingsbury thrust bearing at one end, accommodates thrust in either direction. Sleeve and thrust bearings must be pressure lubricated at all times. Through electrical and lubrication pressure interlocks, full oil pressure is insured whenever the shaft is rotating. Fig. 4 shows the schematic of a *Tonrac* lubrication system.

Purge System

Like the lubrication system, the purge system for the centrifugal compressor-chiller-condensing unit is a very important auxiliary to the main

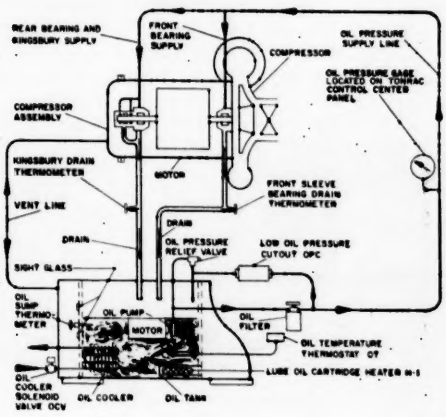


Fig. 3. Lubrication system of the hermetic centrifugal features a closed pressure system.

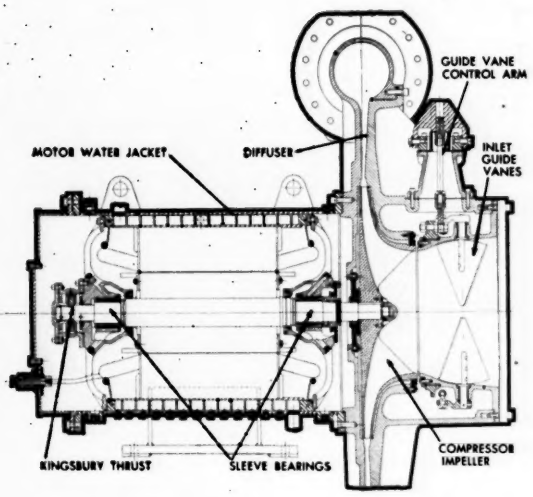


Fig. 4. Lubrication points and principal compressor components.

plant. The knowledge of this system and its functions is not only essential to good operating, but a thorough understanding is also necessary in order to properly shutdown the unit at the end of the season's operations. The *Tonrac*, like other makes of similar equipment, has a self-contained automatic purge unit for removing non-condensables and water vapor from the refrigeration system. The purge unit is either mounted on the condenser or it may be free-standing floor-mounted in some plants (see Fig. 4).

Purge From Condenser

Principle of operation in a purge system is outlined in Fig. 5. Two connections or shut-off valves are provided for the purge system at the top of the condenser shell where air, water-vapor and most non-condensables are likely to accumulate. Non-condensables are lighter than the refrigerant; hence, they would be found at the high point of the condenser.

Oil Separation

Refrigeration type valves are provided for a shut-off isolation. When these are open and the purge unit started, the non-condensables along with an amount of refrigerant gas is drawn into the reciprocating purge compressor. There the mixture of gases is compressed and discharged to the purge unit oil separator.

The separator itself is heated by a resistance type disc heater which is controlled thermostatically. Temperature sensitive element of the thermostat responds to the oil temperature, maintained at 150F.

Excess oil in a purge system remains in the oil separator until a pre-determined level is reached. Then a float control valve returns the oil to the purge compressor crankcase.

Water Trapping

Gases from the oil separator are driven to the spray header in the purge drum. There they come in contact with a water coil which causes the refrigerant and water vapor to be condensed. Both settle to the bottom of the drum but the water being lighter floats on top of the refrigerant. At this point a manual operation is in order.

A sight glass is provided on the purge drum which will show the amount of water condensed in the drum. When the water reaches the half-inch level it should be drained off (manually). The liquid return float valve in the drum allows excess liquid refrigerant to drain back to the evaporator through the liquid isolation solenoid and a manual shut-off valve at the evaporator.

Gas Purging

Non-condensables remaining in the purge drum are vented to the atmosphere by a pressure relief valve set to relieve at 15 psig. Non-condensables are not, therefore, continuously discharged to the atmosphere —only when the internal pressure of the drum exceeds atmospheric.

Cooling water for the purge condenser cooling coils (which is located in the purge drum) is normally piped from the return chilled water line in air conditioning systems. However, in order to provide for purging when the unit is shut down, a city water connection is also made and can be used when the chilled water pumps are not running.

As noted herein and as understood by all competent operators, collection of non-condensables and water vapor in the refrigeration system is not desirable. It not only cuts down the effectiveness of heat transfer surface in both condenser and evaporator, but it results in high condenser pressures and temperatures, resulting further in higher power bills.

The purge system, properly used would not only keep the refrigeration system free of non-condensables, but provides a means for water vapor removal, reducing corrosion.

Post Cooling Season Plant Shutdown

To properly shutdown a type of hermetic compressor-chiller-condenser unit such as described here, engineers are urged to break out the manufacturer's instruction booklet and follow the procedure outlined therein with a great deal of care. Although the instructions are simple and may contain the same basic information for all makes, and even the principal equipment may be alike in appearance, design variations call for different practices. There are then slight differences between various makes and only the instruction manual of each manufacturer will contain pertinent instructions regarding variations of his product from others.

In proceeding to shutdown after completion of the cooling season, plant engineers should carry out their routine shutdown procedure, then tackle the post-season steps.

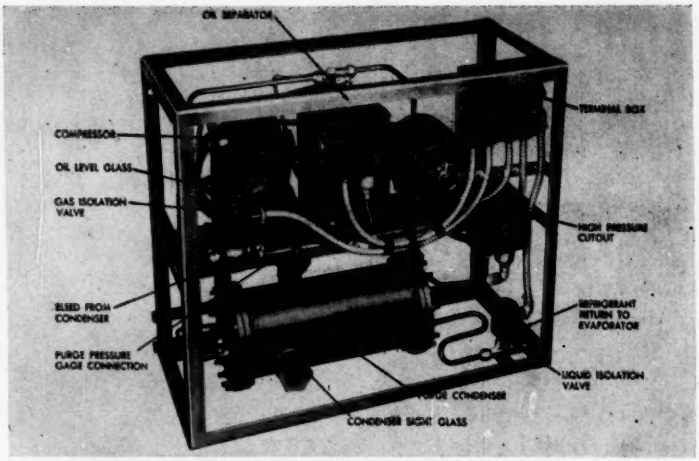


Fig. 5. Principal components in the foul gas purge system for the centrifugal compressor-condenser-evaporator water chilling unit.

Routine Shutdown

For either manual or automatic sequence control, shutdown of *Tonrac* is initiated by turning the lube oil pump selector switch to "off" position. Selector switch is located on the control panel (see Figs. 1 and 2).

Placing the lube oil pump selector switch in the "off" position will shutdown the refrigerating unit. *The compressor motor must come to a full stop before the next step can be accomplished.*

After the compressor motor is fully stopped, the chilled water pumps may be stopped. Then the condenser water pumps are also secured. (If automatic sequence is used, the condenser pumps will automatically stop when chilled water pumps are off).

Auxiliary Instructions

The next step in a routine shutdown is to turn off the cooling tower fans. (Again, if an automatic system is used the condenser fans will generally be stopped automatically when the chilled water pumps are turned off. *Tonrac* is arranged in that manner when automatic sequence is selected).

For routine or daily shutdown, the throttling valves in the auxiliary cooling circuits of the lube oil cooler, motor jacket and purge systems, are left in their normal operating setting. Shut-off valves are left wide open. For a seasonal shut-down, engineers should carefully observe the special instructions pertaining to these units.

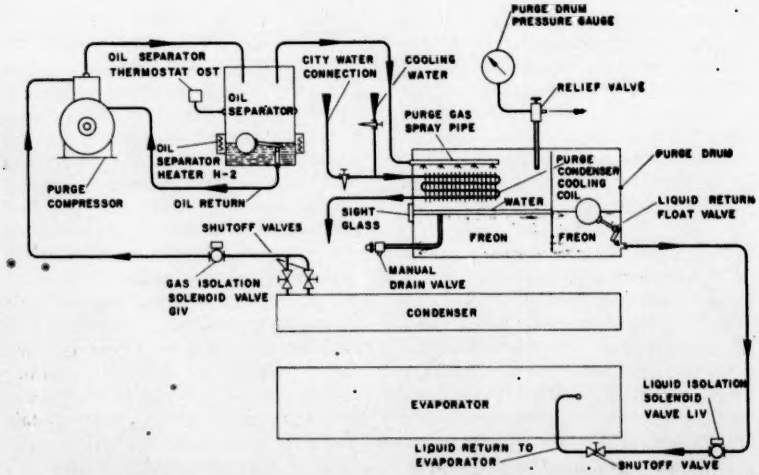


Fig. 6. Schematic of purge system showing connections for water supply to the purge condenser, and oil return from separator to purge compressor. Water vapor present in the regrigerant side is condensed out in purge drum and drained off manually, but liquid refrigerant is returned automatically to evaporator and oil similarly returned.

Also, for a routine shutdown the control circuit breaker is not opened. The lube oil heater circuit must be energized at all times and to open the circuit breaker would de-energize the heater. For a prolonged shutdown such as following the cooling season, it may be desirable to open the circuit breaker for inspection and maintenance. Steps should be taken to insure the lube oil heater circuit is energized during the entire shutdown period.

Additional Steps For Post Season Shutdown

After carrying out the routine shutdown procedure, the purge oil heater selector switch located on the control panel, should be turned to the off position.

Next, the condenser water system should be drained if exposed to freezing temperatures. Routine maintenance procedures for such systems would then be in order. If the plant employs a cooling tower in the condensing system, the tower and its associated piping should be drained and inspection, maintenance and lay-up procedures be observed.

In order to properly drain the water boxes the vents on these should be open. When the condenser system is completely drained, the vents should again be closed.

Drain plugs at the bottom of the motor cooling water jacket and the vent plug on the tube of the jacket should be removed to completely drain the jacket cooling water circuit. After draining, the vent and drain plugs should be replaced.

If any part of the chilled water circuit is exposed to freezing temperatures the chilled water circuit or process media circuit should also be drained. Some plants have exposed areas arranged in such a way that only that segment which needs to be isolated, is drained for winter lay-up.

Care and maintenance of all associated equipment such as water pumps, cooling towers, etc. should be carried out in accordance with manufacturer's instructions.

The purge system auxiliary cooling circuit is normally supplied with return chilled water from the main evaporator water circuit during operation, and when the chilled water pumps are running. The purge cooling circuit from the chilled water system should be valved off completely during seasonal lay-up since city water is to be used when operating the purge system during periods of prolonged shutdown.

(Continued on Page 27)

NAPRE QUESTION BOX

H. P. Hayes

HAVE A QUESTION? Address it to Prof. Harold P. Hayes, Dean of Engineering, State Polytechnic College, San Luis Obispo, Calif. Answers appear monthly in this department on problems forwarded by NAPRE members. Comments from all readers welcomed.

Vinegar Counteracts NH_3 But No Mask Substitute

QUESTION: Our chapter president tells us that a sponge saturated in vinegar will act as a temporary gas mask. Paul B. Christensen, NARW, quotes a warehouseman as writing "vinegar sprayed in an ammonia contaminated room reduced the odor to zero". Why? What is it in vinegar that neutralizes the toxicity of ammonia?—D.D., FB Chapter.

ANSWER: Vinegar contains about four to five percent acetic acid. This acid reacts with ammonia to form a salt (ammonium acetate) acid water, thus neutralizing the ammonia which is a base.

To this we might add the comments from K. M. Holaday[1]: "A sponge soaked with vinegar might serve as a temporary mask if you could stand the vinegar vapor without choking, but I do not think this expedient should be considered at all as a substitute for adequate gas masks or breathing masks.

"As to using vinegar for absorbing ammonia in a contaminated storage room, it might work for a small area if you had enough vinegar and spraying facilities in the right place. However, a water hose may be the only practical means generally available in the average plant.

"In my opinion, the best method of clearing a contaminated atmosphere is to provide adequate forced ventilation. We have reviewed the National Safety Council Safe Practices Pamphlet No. 61, and also American Standard Safety Code for Mechanical Refrigeration, but neither publication says much about this sort of problem. Perhaps NAPRE could make a valuable contribution by preparing a 'Tight Squeeze' manual for dealing with emergency situations."

—R. G. R., San Luis Obispo

[1]Holaday is a past national president, NAPRE, and Utilities Engineer, Anheuser-Busch, Inc., St. Louis.

Refrigerating With Agricultural NH_3

QUESTION: There are, we believe two grades of ammonia being manufactured, one is commercial and the other refrigeration grade. We would like to be assured that we are supplied anhydrous ammonia of the refrigeration grade. What is the composition and physical property of this commodity and how can it be tested to assure us that it is refrigeration grade? What are the disadvantages of commercial grade anhydrous ammonia for use in refrigerating plants?

—K.R.B., Karachi.

Agricultural grade ammonia (so-called) is being made available in many areas where refrigerating plants are located. We have been told there is no difference between this ammonia and the kind purchased from refrigeration supply companies. The Question Box can render a service if it would publish unbiased and authentic information on both kinds of ammonia.

—NAII.

ANSWER: In replying to K. R. B., the Technical Department, INDUSTRIAL REFRIGERATION, had this to offer: "Specification sheets published by the various producers of anhydrous ammonia generally show both commercial grade and refrigeration grade on the same sheet where the characteristics of each can be easily compared. There is considerable difference in purity and the technical department would not recommend use of commercial grade anhydrous ammonia in refrigeration systems."

In replying to this reader the department supplied photocopies of NAPRE Bulletin No. 22, dated November 18, 1925. Perhaps the only change that has taken place since the paper was published, the reply stated has been the synthesis of ammonia from natural gas sources several of which have been reported in INDUSTRIAL REFRIGERATION[1,2]. Even in these new developments the specifications for refrigeration grade and commercial grade has not narrowed in appreciable amount.

IR's Technical Department also furnished photo copies of questions and answers which have previously appeared in IR[3,4]. These questions were prompted by a discussion at the NAPRE Midwest Regional Educational Conference in Chicago in Spring, 1955. The results reported there and the replies published to the questions were not encouraging.

Pennywise—Dollar Wasting

The second inquiry published last month was first directed to a past president of NAPRE who referred it to the Technical Editor of IR. The past president commented about the 1955 NAPRE discussion, adding these remarks. *"It was my personal view that agricultural grade ammonia would be satisfactory for refrigeration use in a well operated and well maintained plant. However, this is my opinion only and is not based on actual experience or scientific study of the problem."*

In follow-up, the technical editor added "As this past president has pointed out, a well operated and well maintained plant can probably use it without any difficulty. Also, as mentioned, we do know of plants which have used the less refined product. However, the specific plants known to us which have operated successfully are equalled in number by those which could not use the agricultural product with any degree of success. Further, the engineers in the successful plants were more of the same good caliber as this past president; the

[1]10,000 Ton Refrigeration Plant Used to Manufacture Chemicals, INDUSTRIAL REFRIGERATION, March 1954, P. 15.

[2]Ultra-Low Temperature Used For Industrial Manufacturing of Ammonia Products, INDUSTRIAL REFRIGERATION, March 1957, P. 13.

[3]Question No. 1047, April 1955, Page 45, INDUSTRIAL REFRIGERATION.

[4]Question No. 1062, July 1955, Page 50, and September 1955, Page 32.

plants which failed were not any more successful in their choice of engineers than they were in the choice of the refrigerant grade and perhaps for the same reason—they tried to save too many pennies.—J. R. K., Chicago.

Data on Building Material Heats

QUESTION: Having had no theoretical training (college engineering) it is sometimes difficult to reason out certain practical problems requiring fundamental physics and math. Here's an example:

We had taken over some old WW II (frame) warehouses in a growing area for sorting use and as shaded depots for truck and car loading. Produce was in an over-abundance and droughts in other areas prompted canning and freezing in record breaking quantities. However, cooler storage was critical and more refrigerated transportation unavailable.

It was proposed that the old warehouses be converted for coolers, and afterward for temporary freezer storage. Adding insulations, finishes and doors in a short time was no problem, but product arrival overtook completion of the refrigeration.

Relies On Notebook

The plant was far enough along to assure start-up in time for holding cooler temperatures. However, there was no time for pull-down nor product cooling. Through years of experience I had made tables and notes on how to calculate heat transmission through structures, and heat loads in our various products. Our plant operations proved my figures right.

But where in the world can data be found on six-inch reinforced concrete poured over insulation: on fill insulation and lumber which lay exposed in 100 F sunlight before installation and was probably not under 90 F at the time it was placed? On pipe coils and steel materials installed in 90 F ambient conditions?

Seeks Tables or Data On Heat Content, Transmission

In other words how many Btu were contained in these construction materials, so I could figure on temporary water ice bunkers and blowers for my emergency pulldown? My guesstimates were high, but excess ice was cheap compared to carloads of rotten produce. The boss forgave me that un-used carload of water we had left over after the ice melted.

But even today, I would be estimating from this experience unless you can show me how to figure such items, and where to find tables of heats in such materials.—G.S.A., MAL

ANSWER: For the specific heats of the materials you mention, see the ASRE DESIGN DATABOOK and MARKS' MECHANICAL ENGINEERING HANDBOOK.

SPECIFIC HEATS
CONSTRUCTION MATERIALS

Material	Btu/°F-lb
Concrete	0.16
Iron	0.11
Wood	0.45-0.65
Insulations	
Glass, Rockwool, Ashes, other minerals	0.20
Cellular, extra dry wood, cork	0.35-0.50

There is some disagreement and ambiguity among the tables. These are probably due primarily to the hydroscopic nature of most of the materials and secondarily to the non-homogeneity of building materials.

To find the total heat which G. S. A. seeks, specific heat is used in the following equation:

$$Q = WCp\Delta t$$

Where

Q = heat to be removed, Btu
W = weight of material, Lbs
Δt = difference between the initial temperature of material and the final steady state temperature of the material after equilibrium conditions are established in the warehouse, °F.
Cp = specific heat, Btu/°F-Lb

For each material in the floor, walls, and ceiling, the heat to be removed must be calculated. To simplify calculations, items of small mass, air in building or even in solution, may quite often be ignored.

If the specific weight or gravity is needed in the determination of the weight of the materials, Marks' Handbook is a good reference. The estimation of the final steady state temperature for each of the materials requires either excellent engineering judgment or good analytical technique. I will assume that you have the former since the teaching of the latter would require a full fledged feature in this magazine.—R. G. R., Cal Poly.

NEW QUESTIONS

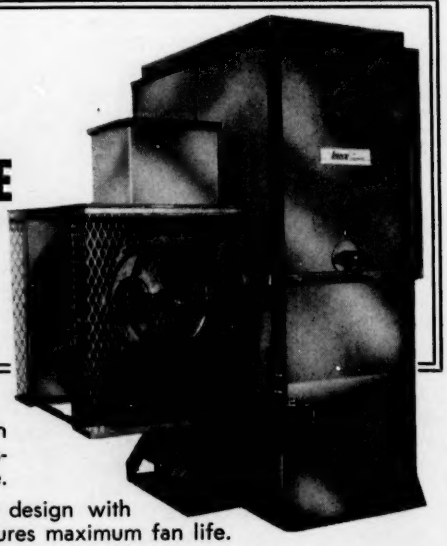
on Pages 28, 29

New!

LARGE CAPACITY

EVAPORATIVE CONDENSERS

capacities up to 300 tons



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Single-Stage Centrifugal

(Continued from Page 24)

Long Shutdowns

During the period of prolonged shutdown, or seasonal shutdown, the purge system should be operated every week for a period of two hours.

Open the city water valve and the drain valves to provide approximately two gpm of flow through the purge cooling circuit. Turn the purge (oil) heater selector switch to the "on" position, and wait thirty minutes. Turn the purge compressor switch to the manual position and run the compressor for two hours.

After two hours of purging, turn the purge heater and compressor selector switches to the "off" position. Close the city water and drain shut-off valves.

The relief valve is set to vent the non-condensables to the atmosphere at 15 psig. If the pressure on the purge gage on the instrument and control panel rises above 15 psig, turn the relief valve adjusting screw counterclockwise until the purge pressure relieves at 15 psig.

Check Water Supply

When the purge system is in operation, the sight glass should be inspected from time to time to make sure that the refrigerant is condensing or dripping from the cooling coils. If not, check the cooling circuit water flow. Sufficient water must be provided to condense the purged refrigerant.

The refrigerant level must be visible in the sight glass at all times. After extended periods of purging (3-4 months), a layer of water will build up on top of the refrigerant. When the water level reaches a depth of 3/8 to 1/2-inch., the manual drain valve on the end of the purge drum should be opened *carefully* and just long enough to drain off the water. Be sure to close the valve tightly after draining the water.

Survives Five Ton Icing

▶▶▶WHEN the Tracy Ice and Development Co. dumped five tons of ice into a refrigerator car on September 5, shouts coming from the car convinced them that they were neither icing fish nor fowl, nor fruit and vegetables. It took an hour to dig the transient out of the car into which he had climbed in the 96 F weather. Doctors reported the patient severely chilled but very likely to survive.

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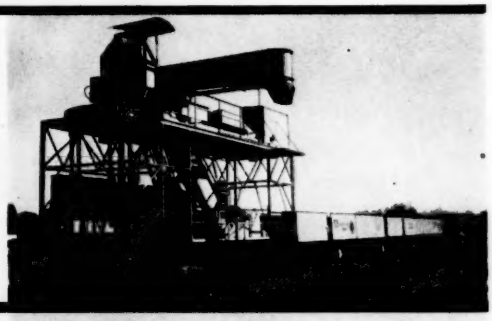

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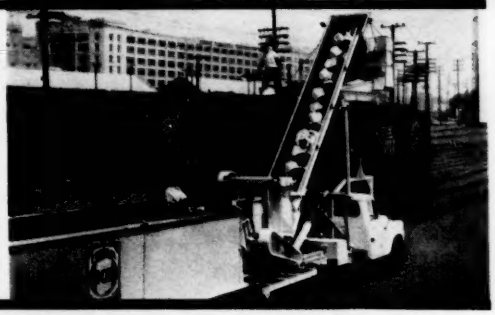

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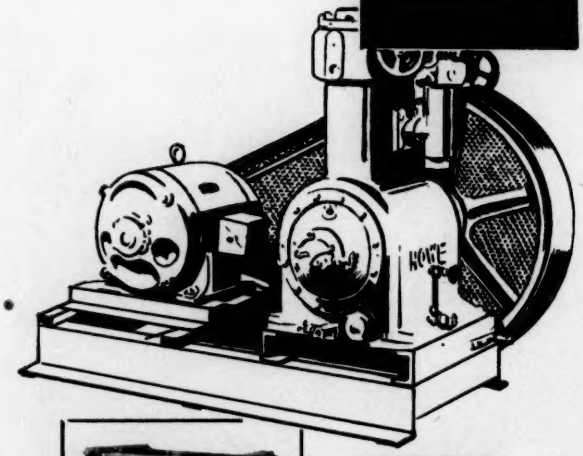

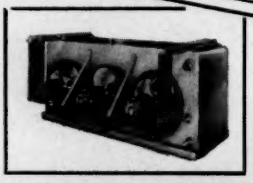

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NEW INQUIRIES of

Removing Oil From Aero-Sols

QUESTION: Aero-sol propellants received via rail car at our plant are discharged to storage by pressurizing the tank car (tankers have outlets similar to refrigerant receivers). We employ a Brunner compressor, 4-cyl. Model NR-10 (V type, 3-5/8 x 2-1/2-in) W56-1 operating at approximately 420 rpm. This unit taking suction from our storage tank, discharges through an oil separator and into the tank car at from 50 to 70 psig.

Our problem is this: The supplier contends that we are contaminating the tank car with refrigerant oil and he is back-charging us for cleaning. Our oil separator has no name plate data on it so we do not know the particulars other than it has a 1-5/8-in. OD inlet and outlet, etc. However, we believe that the separator is probably too small or its structure is ineffective. Where can we find literature that would describe the most effective way of removing oil from the compressed aero-sols? They are mostly Refrigerant-12, and combinations of halocarbon gases involving Refrigerant-12. Is there any literature that specifies size and internal arrangements for oil separator vessels?—C.W., Chgo., Ill.

New Scientific Terms Trip Practical Engineer

QUESTION: New terminology, possibly product developments that I have spotted in news accounts or features in Industrial Refrigeration and other trade publications, uses words with which I am unfamiliar; for example, the phrase "filled epoxy resins". That name has come up in connection with the electrical field and in connection with thermal and electrical insulations, as well as compounds, including metal adhesives. What is it and why is it important to our field?

Another name is "polymer". This apparently has something to do with the field of plastics. Can you tell what connection that has with the plastics found in thermal insulation and with the plastic used for pipe and tubing?
—K. C. F., D. C.

Modulating BP Valves

QUESTION: "Proper Refrigeration Increases Meat Profits" by D. D. Wile, January '58, page 31, IR, quotes the results of tests in which the modulating type of back pressure valve was used. This valve increased the back pressure at which the evaporator worked according to air temperature in the room. We in Australia are not acquainted with this sort of valve but feel it has a distinct usefulness. Who supplies this equipment? And upon what principle do these valves function?—J. J. B., Sydney.

LMTD By Nomograph

QUESTION: Would the practical engineer have an occasion to be involved with a formula such as that determining the Logarithmic Mean Temperature Difference? Or, do such pencil and paper manipulations come up only in the realm of the designing engineer? Would a Nomograph cut corners for both the professional and the practical engineer involved in such computations?—J. R. K.

Designating Refrigerants By Chemical Compound Expressions

QUESTION: Our refrigerating system uses Refrigerant 113. In the compressor manual it is described as trichlorotrifluorethane (CCl_2F-$CClF_2$). Guy King's Table 9 in his paper "New Refrigerants", 1957 *NAPRE Op-*

the QUESTION BOX

erating Data Book, shows the same gas to have a chemical formula of $C_2Cl_3F_3$. I presume either way to write it is correct but I would like to know why one author expresses the formula one way, and another author a longer more complicated expression.—R. L. F., Chicago.

Holding Humidity Down With Indirect Refrigeration

QUESTION: One carload of ice which G. S. A. in his question on "Material Heats" in the September issue, wasted, could have been used very readily by this writer not too long ago. Contrary to usual practice, we were required to store a product at less than 50 rh, at a temperature of 36 to 38 F. Like G. S. A., I had some obsolete buildings only I was more fortunate in the fact that they were cooler storage rooms. I also had some old brine pipe coils but no more refrigerating plant. I didn't overcome my humidity problem, the merchandise in cans rusted, and we took a loss.

I have often thought of what I would do again in such an event, using a portable pump and a water ice refrigerant. Would someone care to check me by outlining steps to be taken, to accomplish the rh and temperature requirements if the room size is given, number of lineal feet and size of pipe, and the horsepower or gpm of the pump? The product was precooled when it was delivered and we were to hold it at these conditions in the field.

—J. A. H., Los Angeles.

Wiring Hookups For New Motor Voltages

QUESTION: We have a 175 hp synchronous motor direct drive rewound from two-phase to 3-phase, only name plate reading is 175 hp, 225 rpm, 2300 volts and "rewound to operate on 4160 volt, 3-phase. The motor has 6 name plate for 3-phase but six leads. What method can I take for checking these leads for 4160 volt and type of connection?

Some years ago I worked in a steel mill electric shop where we changed 220/440-volt motors for 208. There we shoved six leads back in the stator and used the 220 leads for 208. What is the difference of power consumption in that case and what would be the loss in torque?—R. P. E., San Antonio.

V-Belt Article Prompts Drive Conversion Question

QUESTION: "Long-Lived V-Belts" in September 1958 IR prompted me to write about a silent chain drive which broke. A new chain was not available. The mechanic made a belt drive out of it wrapping lengths of silent chain around the sprockets and making those lengths endless. On the backs of the chains then, which were fairly smooth, he used a belt drive. The diameters of the sprockets were about 10 and 16 inches respectively, and with the chain on, about one inch greater. The width of the chain (also the belt) was 10 inches. The speed of the motor was 900 rpm. The motor horsepower was 75.

When consulted, I figured that the belt speed was about 2590 fpm. This speed should allow a 2-ply belt to transmit 62.75 hp—which is fairly close to the above 75 hp. However, I further suggested a special high grade belt should have been used. Now, I'll ask the Question Box what was asked of me, "Why not convert to V-Belt drive? Automatic start is almost impossible with flat belt.

—W. F. S., Newark.

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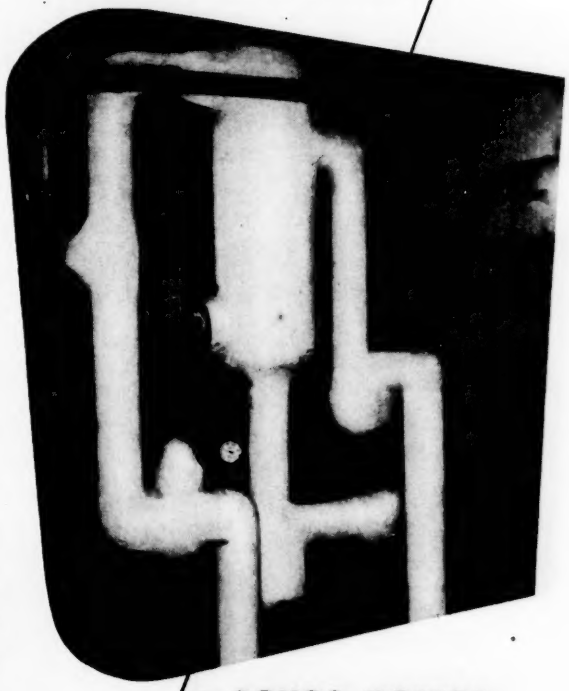

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All refrigerating engineers are invited to affiliate with the National Association of Practical Refrigerating Engineers, Inc., an educational association, "not-for-profit".

From the President's Desk

Frank L. Chase

Chief Executive Points Way To Improved Administration

▶▶▶GROWING PAINS is the title of the editorial in the 1957 NAPRE Operating Data Book. Our editor took the trouble to point out that the principal growing pain at that moment was financial. NAPRE members swallowed the medicine dished out and voted that increase in dues. That internal medication improved the health of the Association.

However, there were other complications. One of those is effective administration of NAPRE affairs. The Association is at present without a full time executive, and without its customary assistant secretary-treasurer. Further, the membership has grown to the extent that two vice-presidents cannot on their own free time direct all committee and chaper activities.

Utilizes Prerogative

As a swansong, your president will exercise the customary prerogative and make some pertinent suggestions. In 1960 the Association should make an all-out effort to locate a full time executive who will continue to grow up with NAPRE. Further, NAPRE should provide for advancement of national office assistants, to responsible positions as assistant secretary and/or assistant treasurer; to provide some incentive which in the past has been lacking.

Recommends Amendment To Provide Third VP

An amendment to the by-laws will be in order if NAPRE is to improve adminstration and coordination of its membership work, and its educational and industry relations activities among the chapters in the United States. The office of a 3rd vice-president should be established. The nation should be divided geographically into three areas and each vice-president assigned the responsibility of coordinating NAPRE activities in their respective areas. The directors should be paired off to work with the vice presidents on a regional basis. These officers and directors would also assist members-at-large as they have in the past.

Suggests Educator As Active Director

In recent years the president and board of directors have designated the retiring president as educational director. On top of his traditional duty as chairman of the nominating committee, plus the duty as chairman of the board of advisers required under the by-laws, this is a large order. NAPRE has among its membership a number of educators, deans of colleges who can do an excellent job of directing the association's educational program. Some thought should be given toward election of one of those educators as a director. Such a change of course should be considered by the board, possibly referred to a committee and referred back for action in a year.

Urges Due Consideration of Other Officer's Proposals

The national secretary, and other past officers and directors, have from time to time made the suggestion that the retiring president return to the Board of Directors as chairman. In all modesty the retiring president cannot actively advocate such a program, although he does see after his term in office the advantages and agrees with the proposers of this idea that it is sound reasoning.

It is understood that others are taking the leadership to bring about such a change. In all probability this is a matter that will be decided at the final business session on November 13. It could well be that this proposal would also improve the administrative functions and continue the recent growth and progress of NAPRE.

As a final message of this term, your president finds it very difficult to choose appropriate words to express his thoughts to all who have made an exceptionally tough year smooth, and who have contributed so much to the maturity of our association. Thanks.

Frank L. Chase

Fall Brings Stepped-Up NAPRE Chapter Activities

Ham and Bean Feed Honors Stubblefield

LOS ANGELES—Traditionally, members of California Chapter No. 2, NAPRE, open their Fall meeting sessions with a Ham and Beans Feed at the Terminal Club. The 3rd Wednesday in September, 1958, was no exception. Victor "Stubby" Stubblefield, ex-president of the chapter was honored at this meeting for his service to the chapter.

First part of the kick-off meeting was in the form of a social during which time the membership was entertained by a strolling singer-accordianist who kept the hall alive with song and merriment through her ability to render most any song number requested. She even managed a few bars of Mademoiselle from Armentieres which had been requested by an old timer reminiscing over his World War I days in Paris.

Direction of the program was under Ed. Nelson, whose chairmanship has always been somewhat traditional. Ed was in rare form again this year and brought out an attendance large enough to add a substantial sum to the chapter's treasury, after overhead

Jack Hammersmith, PFE Co., did his share to enliven the party by freely dispensing the refreshments. For years Jack hovered in the shadow of "Stubby" Stubblefield who served as bartender for the Ham and Beans dinners. Last September Stubblefield was transferred to Bakersfield, Calif. by his company and Hammersmith was promoted to chief bartender post by unanimous acclaim.

President at New Chapter

Now Bakersfield's prexy, who should come marching in in the midst of the social hour, but Stubblefield. He made the 220-mile round trip to attend the Los Angeles meeting. He was welcomed enthusiastically by Los Angeles members who had not seen him since he resigned as chapter president when his transfer became effective. Bakersfield had promptly elected Stubblefield its first president when the group was organized there.

Following the dinner, Stubblefield was presented with the customary gift which all outgoing presidents of California Chapter No. 2 receive when leaving office. The current president, Mike Julius, "Stubby's" successor took care of the matter by presenting a token of appreciation for the years of service Stubblefield had rendered the chapter. Gifts were distributed to lucky members following the dinner. Winner of the grand prize, a portable TV set, was Hiroshi Takusagua, a service engineer of Ralph E. Manns Company. The chairman also came through with a surprise and announced a floor show which met with the hearty approval of those in attendance.

President Julius also arranged another surprise. He introduced Kid Mohler, a white-haired waiter at the Terminal Club, whose claim to fame on September 17 was the fact that this was the 25th consecutive Los Angeles Chapter dinner at which he had served the members. Mohler is an uncle of the late Orville Mohler, All-American Halfback of the University of Southern California, who was so popular with the members of this leading Southern California chapter.—FRED HERR.

NYC Gaining Stature, Reports On Past Program

Officers and program committee of Metropolitan New York Chapter were pleased to learn that the National Educational Committee had selected a speaker and his paper presented this past Spring by the Chapter, as one of the features of the 49th annual meeting to be held in Miami Nov. 11-13. Walter Smith, General Chemical Div., Allied Chemical Corp. gave two presentations on the proper evacuation of halocarbon refrigerant systems, backing them up with a case history on a 100-ton central station plant which failed within a very short period of its acceptance date.

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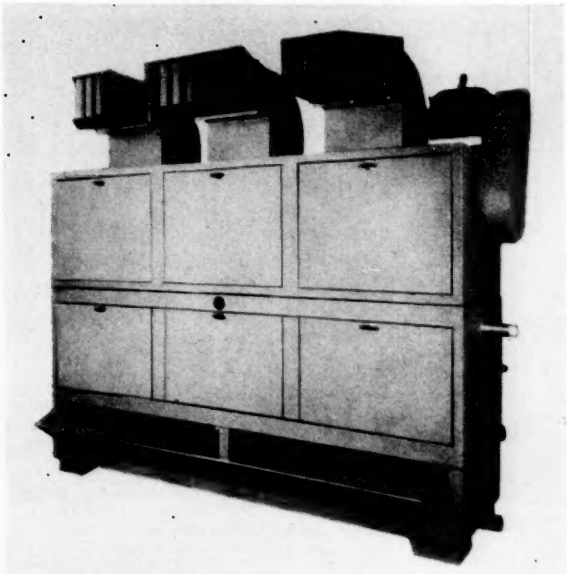

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Noting that attendance was stimulated considerably by field trips, New York Chapter will suggest that its representative at the National meeting bring out that fact in the Chapter clinics. Even field trips to the same type of activity when there are different applications to be seen, makes a big hit.

One of the earliest field trips in 1958 was a meeting at the Seaboard Terminal and Refrigerating plant in Jersey City. The inspection trip which followed high-lighted four giant Ball HDA compressors. Many members who have entered the field post-war have never seen compressors of this type. Naturally, they were amazed at the cylinder dimensions which range from a 14 in. bore by 28 in. stroke on the high stage, to a cylinder measuring 26″ with a 36″ stroke on the booster side. These compressors are driven at 80 rpm by 4150-volt 450 hp synchronous motors.

Ice-Making Demonstrations

The tour also included a detailed explanation on the manufacture of ice including the processing of ice cubes from 300 lb. blocks. Next, the group was conducted through the ten floor warehouse and food processing building. Evaporative equipment inspected was a wide variety, from top feed hand controlled ceiling coils to automatic Niagara *No-Frost* coolers in a minus 20F room. Not only were visitors impressed, but members new to the industry as well by the wide variety of products in cold storage. There were apples from Washington State and raw pharmaceuticals (roots and herbs) from Europe; potatoes from Maine and dates from Arabia. Many visitors admitted it was the first time they had visited a cold storage warehouse. They had no realization of the services that were available.

A few months later, the Chapter toured another refrigerated warehouse, this time meeting at Merchants Refrigerating Co. plant in Jersey City. The group was treated to a neat, clean engine room that included machinery both old and new. Compressors ranged from the HDA and VSA, to more modern VW types. Liquid pumps tipped off the fact that ammonia recirculation is used in the newer portions of this plant. Brine coolers on the other hand indicated that indirect refrigeration is accomplished as well. New York did well in promoting attendance through these two tours and the tour of the Sheraton McAlpin Hotel. It recommends this practice as an attendance bioster.—Quaid Munich.

Conference Movies and Question Box, Tenn. Topics

Memphis—Second meeting of the Fall term for Tennessee Chapter No. 1, featured J. R. Thompson, president of Mississippi Chapter No. 1, Jackson, and national membership committeeman Frank R. Goulding of Atlanta, Ga. These two had been busy earlier in the week in other Mississippi cities trying to interest practical engineers in a chapter at Hattiesburg. They presented a moving picture of the South Central Regional Educational Conference, NAPRE, which had been held in Jackson.

Goulding narrated the picture as it was shown since it was not a sound type. Thompson related how Goulding had taken the pictures and was showing them around the NAPRE chapters in the hope of encouraging high level attendance at the NAPRE convention which is to be held in Miami.

The movie showed in detail various activities during the conference. Opening the meeting with an invocation by a local minister, the educational program proceeded with the presentation of three speakers, a tour of the refrigerating and air conditioning plant in the National Bank Building at Jackson. Swift & Company entertained the out-of-town visitors that afternoon and movies were taken of the various portions of that new plant. The dinner and dancing which closed the conference is photographed showing a number of the national and local members relaxing.

The second half of the Memphis meeting was devoted to a question and answer session which was in two parts. H. L. Todd, the chapter instructor reviewed a number of questions and answers from Industrial Refrigeration.

—Chas. A. Conley.

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Pennsylvania Meets Through The Summer

LANCASTER—While the summer months are usually a very busy period for those engaged in refrigeration, Southeastern Pennsylvania Chapter, NAPRE, continued to meet nevertheless. Attendance has been good, better than 40 percent of the membership, and even the Membership Committee has produced. Gerald Morrow, Lancaster and Lester Frey, York being the two latest additions. This Chapter makes a practice of presenting new members with a lapel pin in addition to the regular certificate and membership card. Chapter President introduces each new member by presenting these items in a little ceremony.

Educational sessions at each meeting are followed with a parallel or supplementary talk by one of the members. On August 13, the Chapter educational session was on food preservation, Chapter 13 of Guy King's BASIC REFIGERATION. Charles Golin, Lancaster Packing Co. led the secondary discussion with a talk on the preservation of meat.

Lancaster boasts the largest stock yard east of Chicago. Therefore, members in this area engaged in the packing game are considered experts. Golin briefly discussed meat processor's problems such as shrinkage, mold, bacteria, sanitation, government inspection and grading. One of the most interesting comments was the difference pointed out by the speaker in buying habits of the housewife with regard to grade. Demand varies for meat grades with regard to economic conditions in most sections of the larger cities.

Second meeting in August featured S. M. Rambo, Plant Engineer for Consumers Packing Co., growers, processors and packers of frozen vegetables. Rambo outlined briefly some of the problems encountered in this type of operation, pointing out that the frozen pack is not the only point of care for frozen foods. It must be held at sub-zero temperature during storage, transportation, retailing and in the hands of the consumer, to within a few minutes of consumption.

Problems of food preservation by freezing starts even before the seed is planted. Storage and care of seed from the previous year's harvest to the spring planting time effects quality. Care is required during the growing season in order to produce a fancy quality product. Every effort is also made to maintain the quality in the frozen pack that is present in the raw product when it is received in the plant.—S. M. RAMBO

Competition Stirs Mississippi Chapter

JACKSON—To stimulate a little friendly rivalry and competition among membership elements in Mississippi Chapter No. 1, it was decided at the first Fall meeting in September that there should be three separate groups within the chapter, each group headed by a group captain. The competition among the three segments of the membership will be in new membership promotion. Each group will compete to see who can bring in the most new members, and the runner-ups will be faced with a penalty, yet to be decided.

Charter Member Loses Life

On August 4, 1958, William L. Clark, charter member, was electrocuted while on a service call for his employer, Palmer Air Conditioning and Heating Co.

Clark was dispatched to clean the condensate drain lines on a packaged air conditioner in the attic of a local medical clinic. It was reported by a janitor assisting Clark that he (Clark) was holding onto the drain line and reached over the condensing unit for something when his left arm struck an exposed wire in the control box. Clark slumped over immediately without uttering a sound. The janitor yelled for help and his call was answered by five doctors from the offices below.

Artificial respiration was administered by the doctors and also the Jackson Fire Dept., without any results. An ambulance was summoned and he was rushed to the hospital where his chest was opened and his heart massaged but, this also was unsuccessful.

Services were held for him August 6, in Philadelphia, Miss. He is survived by his wife and one daughter.

—J. R. THOMPSON

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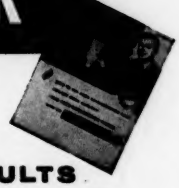

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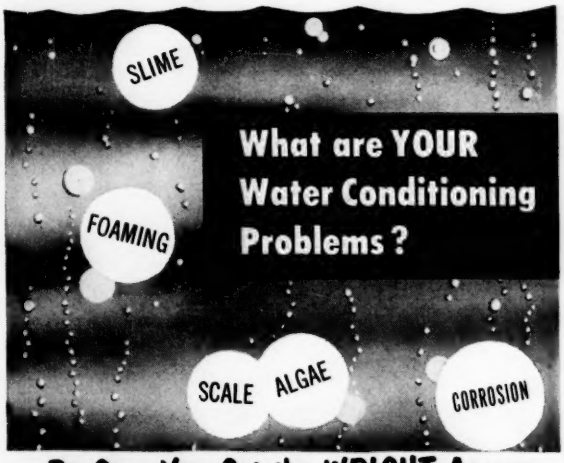

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Chicago Chapter officers, NAPRE, are, l. to r. standing, Earl McMichaels, 1st Vice President, Power Plants Supervisor, Illinois Bell Tel. Co.; Hubert Rancour, Treasurer, Chief Engineer, South Water plant, Central Cold Storage; Wm. Tiffin, Corresponding Secretary, Ideal Elec. and Mfg. Co.; Seated, l. to r., Joe Laskowski, Sgt.-at-Arms, Plant School Instructor, IBT; Roger Hart, Engineer, Howe Ice Machine Co.; Ben Garzynski, 2nd Vice President, Engineer, City Products Corp.; Recording Secretary Wm. O'Reilly does not appear in photo. O'Reilly is Engineer at Dearborn-Clark St. plants, Central Cold Storage.

CHICAGO—Ladies' Night, followed with entertainment, introductions of industrial members and installation of officers, were four points of a 5-star program presented by the Chicago chapter, NAPRE on September 23. Fifth point in the program, of course, were the refreshments which concluded the evening. The meeting was held at the Chicago Engineers Club. Illinois Bell Telephone Co. presented a color-sound production on the Strange Case of The Cosmic Rays. Members were treated to a review of physics and a liberal education on neucleonics of the atomic era.

Installation of the new chapter officers had been unofficially deferred from the customary Summer meeting to a Fall meeting when more members could attend. Past chapter president Nicholas Downes presided, charging each officer with their responsibilities. The new chapter president, Roger Hart, presented representatives of the sustaining and sponsoring industrial members, and introduced contributing or local industrial members to those present.

Novel and entertaining was the little specialty act which Hart requested and got in the form of cooperation from the ladies. The new president, after refreshing the ladies' memories on the pledge which the new members in NAPRE generally take, asked if they would consider a similar pledge. Having them stand, he asked them to repeat the following:

"I (each lady repeating their own name) do hereby solemnly and sincerely promise that I will promote and encourage my engineer husband, to better prepare himself for finer things in life.

"The finer things in life are Mink coats, Cadillac convertibles, diamonds, rubies and pearls. I will encourage him to participate in, plan and execute the activities of the NAPRE so that I, I mean he, will invest in these finer things of life.

"I propose to disconnect the television, remove and hide the tubes, relocate and secure the radio in places unknown. This I will do each 2nd and 4th Tuesday of each month.

"I will further the cause by giving him an extra 50 cents so that he may attend the NAPRE meetings. All this I solemnly and faithfully promise to fulfill."

Needless to say Hart received the enthusiastic cooperation of both husbands and wives in this surprise event.

—BILL O'REILLY

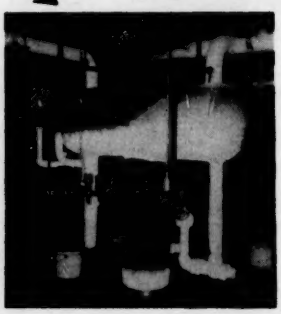
Bright Chapter Repeats

DETROIT —Members of the George B. Bright Chapter, NAPRE, the first Michigan Chapter, believe in giving a little as well as receiving. They also know that the best interest of their membership is served by following suggestions and outlines prepared for the chapters by NAPRE's educational vice-chairman, Guy R. King. Therefore, the chapter is staking out a claim on the title of "best educated chapter" and are challenging other NAPRE units to match their record.

Organizations, like NAPRE, are deserving of industry and public support in their effort to upgrade and advance the practical man in his responsibilities for machinery that guards the health and comfort of the public. Recognizing these facts, the public school system of Greater Detroit makes classrooms available to the local chapter. In return the chapter provides experienced and talented members to instruct the classes. In doing so the chapter recognizes its obligation to the community.

On October 2, the George B. Bright Chapter announced its Basic Refrigeration Course for the 1958-59 season. The text by Guy R. King is being followed. An outline of the program showing dates, subjects and instructors will appear in Dec. IR.—L. L. ADAMS

A RECIRCULATOR PUTS COILS TO WORK AND PROTECTS YOUR COMPRESSORS



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November 10-14, 1958
Traymore Hotel, Atlantic City, N. J.

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS
November 11-13, 1958
Kenilworth Hotel, Bal Harbour, Fla.

NATIONAL COMMERCIAL REFRIGERATOR SALES ASSN.
November 17-19, 1958
Golden Gate Hotel, Miami Beach.

NATIONAL ASSOCIATION OF ICE INDUSTRIES
November 18-21, 1958
Biscayne Terrace and Everglades Hotel, Miami Beach, Fla.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS
December 1-3, 1958
Roosevelt Hotel, New Orleans.

NATIONAL WARM AIR HEATING AND AIR COND. ASSN.
December 1-4, 1958
Cleveland, Ohio

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING
December 1-5, 1958
New York Coliseum, New York, N.Y.

DAIRY & ICE CREAM INDUSTRY EXPOSITION
December 7-13, 1958
Navy Pier, Chicago, Ill.

INTERNATIONAL ASSOCIATION OF ICE CREAM MANUFACTURERS
NATIONAL ASSOCIATION OF RETAIL ICE CREAM MANUFACTURERS
Conrad Hilton Hotel, Chicago, Ill.

DAIRY INDUSTRIES SUPPLY ASSOCIATION
Congress Hotel, Chicago, Ill.

MILK INDUSTRY FOUNDATION
Hotel Sherman, Chicago, Ill.

INTERNATIONAL HEATING AND AIR CONDITIONING EXPOSITION
January 26-29, 1959
Convention Hall, Philadelphia

AMERICAN SOCIETY OF HEATING AND AIR-COND. ENGRS.
January 26-30, 1959
Bellevue-Stratford, Philadelphia, Pa.

PRIVATE TRUCK COUNCIL OF AMERICA, INC.
January 29-30, 1959
Sherman Hotel, Chicago, Ill.

INSTITUTE OF AMERICAN POULTRY INDUSTRIES
February 13 to 15, 1959
Municipal Auditorium, Kansas City, Mo.

NATIONAL ASSN. OF FROZEN FOOD PACKERS
March 1-5, 1959
Conrad Hilton Hotel, Chicago, Ill.

THE REFRIGERATION RESEARCH FOUNDATION
April 2-5, 1959
Statler and Mayflower Hotels, Washington, D.C.

NATIONAL ASSOCIATION OF REFRIGERATED WAREHOUSES
April 5-9, 1959
Statler and Mayflower Hotels
Washington, D.C.

EDISON ELECTRIC INSTITUTE
April 5-9, 1959
New Orleans, La.

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April 16-19, 1959
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Oscar Mayer & Co

(Continued From Page 15)

sealed by Fire-Ban; 140,000 board feet involved. Another 30,000 board feet of the board form type insulation was used in the hog chiller ceiling and an additional 11,000 for self-sustaining partitions.

Three-inch layers of insulation were applied to the concrete and brick surfaces of the new pent houses with a second layer bonded to the first. The exterior is covered with heavy roofing and sealed with mastic. Only four inches was applied to the offal cooler ceiling and walls, and concrete covered steel beams. Exterior walls carried a latex plastic finish.

Philadelphia Acquisition

It was in 1948 that Oscar Mayer acquired its Philadelphia plant. Here, too, extensive remodeling of refrigerated areas was undertaken. The ceiling of the grinding room designed for 36F, was insulated with 5200 board feet of styrene plastic. In 1952 similar improvements were made in the Wiener cooler and in 1955 the shipping cooler ceiling was insulated with the same material. In 1956 pipe insulation in the bacon slicing area was replaced with Vapo-Wall, a fabricated pipe covering of Styrofoam.

California Plants

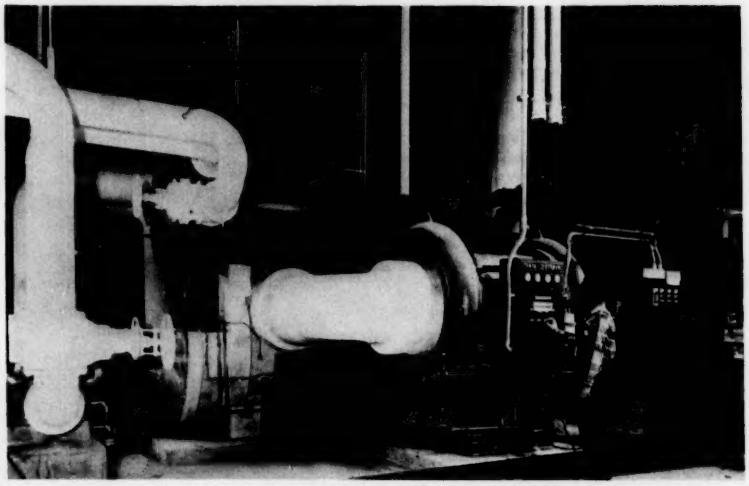
Oscar Mayer & Co. opened a manufacturing plant in Los Angeles in 1951. Five years later a large Wiener processing addition was required and promptly added. Walls and ceilings in that installation were insulated with 190,000 sq. ft. of polystyrene material. In 1957 a second major stride in Oscar Mayer's West Coast operations was effected by the opening of a Bay area branch distribution unit at San Francisco. A shipping cooler room designed for 38F temperature was insulated with four inches of the Dow material in the ceiling and walls.

Educational Conferences For Engineer Personnel

Plant engineers at Oscar Mayer are encouraged by management to derive advantages for themselves and indirect benefits for the company from such organizations as NAPRE. Last year, the Midwest Regional Educational Conference in Milwaukee found two of the Oscar Mayer engineers taking an active part in the educational discussions. One of these same engineers and two others attended the annual meeting which was held in Chicago. Plant engineer at the Madison plant is N. H. Breiby. In charge of the plant at Chicago is Don Ellery. At Davenport, Al Scharman is found in charge, Jack Greaser at Philadelphia, and Norm Rother at Los Angeles.

Although three-fourths of a century tradition backs Oscar Mayer & Company, the organization spends a large portion of its energies looking ahead. Taking cognizance of new merchandising trends, inventing machines, contributing to basic and applied research, buying its livestock almost exclusively on a direct basis, thinking up clever promotion ideas like Little Oscar and his Wienermobile, tightening its quality control system, widening employee benefits and improving manufacturing facilities so as to utilize the best building materials available, is paying off big for "Little Oscar".

Comfort Figures in Missiles, Weapons Production



▶▶▶ FIVE AUTOMATIC centrifugal water chilling machines (one unit shown), provide more than 3000 tons of comfort cooling to all but a few areas of the $6 million, 500,000 sq. ft. Martin-Orlando Plant, Florida, where missiles, small weapons systems and electronic equipment are manufactured. Purpose of the five air conditioning systems is to combine employee comfort and production quality. The plant, which won an award as "One of the 10 Best Plants of America" in 1958, is considered the largest comfort cooled project in the U. S.—*—Photo by the Trane Co.*

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- Up to 5 various sizes of blocks or bags can be vended from this one vendor.
- Radical invention, trouble free, more storage space by design, lower operational cost.

NEW LOW COST 6' x 8' station vends 110-10# packages, or the "Junior", 3' x 7' station vends 90-10# packages using the new multi screw vendor.

ILLUSTRATED 9' x 16' Station vends 168-10# bags and 86-25# block.

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U. S. Industry Engineers At International Meetings

W. T. Pentzer

H. G. Strong

F. J. Reed

B. R. Jennings

H. Nissen

▶▶▶SEPTEMBER and October found many prominent refrigeration and air conditioning figures from U. S. industry in attendance at the various international sessions in Europe. Among these were Dr. R. C. Jordan, Professor of Mechanical Engineering, University of Minnesota, Dr. C. F. Kayan, Professor of Mechanical Engineering, Columbia University, and Dr. W. T. Pentzer, Chief of the Biological Service Branches, AMS, USDA; Frederick J. Reed, Chief Engineer, ARI and Henry G. Strong, Executive Secretary, RISAC, Paul R. Achenbach, U. S. Bureau of Standards, all of Washington, D. C.; Burgess R. Jennings, Director of Research, ASHAE, Cleveland; John Kelley, manager of Fruit Transportation, Fruit Dispatch Co., New York, and Harland Nissen, Vice-president, Terminal Refrig'n Co., Los Angeles.

The occasions for such European jaunts were the International Organization for Standardization (ISO) meeting in London, followed by a number of International Institute of Refrigeration (IIR) Commission Meetings in England, France, Italy, Switzerland, West Germany, Czechoslavakia and Russia. There was also an International Congress for Heating and Air Conditioning in Belgium.

Standards Gathering

Technical Committee 86 (Refrigeration), ISO, at its London meeting found Reed, Strong, Achenbach, Jennings, Jordan and Kayan among the American Standards Association (ASA) delegation on September 18 through 20. The scope of the London sessions was designated as the "Coordination of Standards in the Field of Refrigerating Equipment as Used in Refrigeration and Air-Conditioning". ASA delegation showed particular interest in co-ordination of definitions and terminology, as well as safety and testing standards.

Preceding the London sessions were two IIR Commission meetings in Moscow and Prague. Commission 3 met in Moscow to discuss design, construction and operation of refrigerating machinery and air conditioning plants on September 1-9. Commission 7 met in Prague September 11-13 and discussed refrigerated transportation on land and in the air. Henry G. Strong was the U. S. representative at these meetings. Strong also journied to IIR headquarters for a meeting with R. Thevenot, Director, and then proceeded to Rome for a meeting with Dr. F. Tradari, secretary of Commission 7 before returning home.

Industrial Applications

Following the ISO meeting, Commission 6, IIR, met at Karlsruhe, Germany. This Commission deals with industrial applications of refrigeration and air conditioning. Burgess H. Jennings attended this session as Vice-president of Commission 6.

Jennings conferred with a number of IIR officials, and professional colleagues before and after the Karlsruhe meeting. In Paris he met with R. Thevenot, Director of IIR, where he inspected several environmental installations. Similar laboratory installations at Zurich were inspected and Jennings attended the Heating and Ventilating Session of the Society of German Engineers in their Annual Meeting at Stuttgart.

On September 22-26 the International Congress for Heating and Air Conditioning was held in Brussels. ASHAE Director of Research Jennings participated in that Congress, delivering a paper, "A Critique of Current Knowledge and Research Relative to Human Comfort and Environment".

Consulting Dean of Engineering W. R. Woolrich, Univ. of Tex. will go to Europe this month for Commission 9, IIR, meetings in Paris, following his NAPRE appearance.

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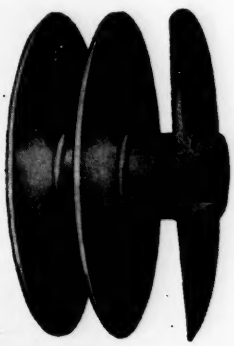

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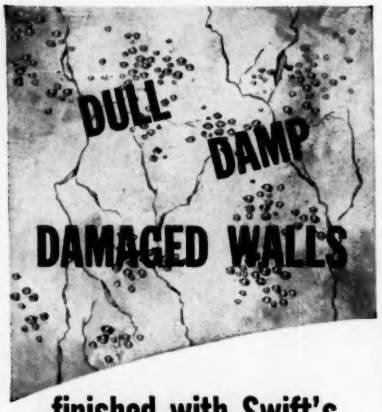

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☐ Send descriptive bulletin
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NAPRE Meet (Cont'd)

Following the Dean will be Daniel M. Roop, Professional Engineer, who will discuss the supervision and training program of his own institution, the Baptist Memorial Hospital in Memphis. Roop, who is the Administrative Engineer, is the author of the paper on training a practical engineer which appeared in the August issue of INDUSTRIAL REFRIGERATION, and the author of a paper on hospital air conditioning maintenance in the September issue, HEATING, PIPING AND AIR CONDITIONING.

John Herzog, Chief Engineer, Burgermeister Brewing Co., San Francisco, will speak to the members on Safety. Herzog is a Past National President, National Ass'n of Power Eng'rs., and a prominent figure in West Coast apprentice and training programs, and industrial safety promotion. He will probably draw on his own personal experiences of the past year when he entered his own refrigerating plant to secure equipment, right in the teeth of an explosion. Herzog survived and contends that any properly trained engineer can survive similarly. As a result of this experience, he has been advocating some changes in the ASA B 9.1 code which NAPRE members would like to learn from him.

Closing Education Sessions

Educational sessions on Thursday will deal with operating and maintenance topics. In the morning, Guy King, Vice Chairman of NAPRE Educational Committee and Instructor at Santa Monica City College, will present a discussion on what a practical man should know about air handling and ventilation.

That afternoon, John Dowling, Fluoro Solvents and Chemicals Division, Organic Chemicals Department of Du Pont, will discuss how greater operating efficiency may be gained and motors given longer, useful lives through proper cleaning methods. Du Pont has introduced a new safe solvent which does not have the toxic hazard of carbon tetrachloride nor the fire risk of naphtha bases.

As a special treat, R. S. Lafferty of Hill York Corporation will conduct a tour of the Kenilworth House on Wednesday afternoon. Under the supervision of Erich B. Utescher, Supervising Chief Engineer of the Kirkeby Hotels (operators of the Kenilworth), Lafferty's firm installed the first sea water sink heat pump installation on the famous beach. A number of these installations have since been placed in operation, but the Kenilworth was the first.

Industrial Members of NAPRE who will be introducing new products at this meeting are: H. A. Phillips & Co.; MMM Inc.; Vilter Mfg. Co.; Recold Corp.; Baltimore Aircoil Co., and Armstrong Cork Co. In addition to these members, Du Pont and Owens-Corning Fiberglas, Armstrong Machine Works and the USDL displays feature new materials or safety and training programs are outlined.

Following its practice of the past couple of years, the Association has scheduled three chapter clinics. The first, conducted by Guy King, deals with chapter programs and annual calendars. The other two clinics deal with publications and suggested financial programs for the chapters. National Officers will serve as conference leaders.

News Around The Industry

Operations Research At Armstrong Cork Company

▶▶ ESTABLISHED by Armstrong Cork Company at mid-year is their office of Economic and Marketing Research. Announcement was made by M. J. Warnock, vice-president, who stated that the new office will coordinate work of several departments.

Albert G. Matamoros, formerly Associate Economist has been promoted to General Manager of the new office. He will be directly in charge of company level activities in economic and marketing research, reporting to the company treasurer Walter E. Hoadley, Jr. Other personnel assigned are William J. Watkins, Manager of Marketing Research, Gray Playter, Manager of Advertising Research, and Warren J. Wittreich, Marketing Research Psychologist and Research Analyst for Personnel Department.

Smart Joins Recold

▶▶ REFRIGERATION representative for Recold Corporation in the greater Chicago marketing complex is Hugh D. Smart, a prominent executive in the refrigeration field for over 20 years.

Smart will headquarter in Chicago, serving Northern Illinois, Indiana, Eastern Iowa and Michigan. He was formerly a member of the Board of Directors and Chicago District Manager for Copeland Refrigeration Corp., and Executive Vice-President for Refrigeration Appliances (Krack).

Layton With Foamglas

▶▶ PITTSBURGH Corning Corp. announced the appointment of James H. Layton, Jr., as manager of Refractory and O. E. M. Sales. With the firm since 1955 he had previously been associated with Johns-Mansville Sales Corp.

Deaths of Industry Persons

Inventor Diserens Passes

▶▶ PAUL DISERENS, inventor, died at his home in Summit, New Jersey on October 6. He was 77 years old. He had been consultant to and was retired as Director of Research Development of the Worthington Corp. Diserens had been with the company 44 years and was inventor of refrigeration engines, valves for compressors and hot oil pumps.

A native of Cincinnati and a Purdue graduate, he was a research assistant at the University for a number of years. He also did research work at the Carnegie Institute and the University of Illinois, and directed research for a Cincinnati firm before joining Worthington. A member of ASME and ASRE, he was a consultant for the National Defense and Development Commission in World War II. There were no immediate survivors.

▶▶ DELTA ICE and Cold Storage Company, Vicksburg, Miss. lost their co-owner and manager in the death of Ralph E. Sprinkell. He succumbed to a heart attack at his home. He was 59. He was a member of the Delta Ice Association.

▶▶ E. HERMAN CRANFORD, 77, retired Asheboro, N. C. businessman, passed away in August. He had headed an ice and coal business and was a member of the Asheboro Fishing Commission.

▶▶ JOSEPH E. DUNCAN, 69, retired employee of Noel Ice Co., Nashville, Tenn., died at his home on Sunday, September 28, after an illness of six weeks. He is survived by his wife, 3 daughters, 2 sons, 2 sisters, 13 grandchildren and 4 great grandchildren.

▶▶ MANAGER of the Hollandale Ice Co., was found fatally shot in his office shortly after opening time on September 30. He is *H. O. Green*, 65-years old, who died shortly after police arrived when his first customer each morning found him lying behind the desk. Motive for the shooting was not established at the time of this printing.

Ice Executive Passes

▶▶ FOUNDER and president of Puritan Ice Company, Leon R. Phillips, 68, died October 13, at his home in Santa Barbara, Calif. He had been in failing health.

A native of Bath, N. Y., Phillips migrated to California in 1930 settling in Santa Barbara where he originated the Puritan Ice Company, the Blythe Ice Co., and the California Vegetable Corp., as well as operating pre-cooling plants at Guadalupe and Santa Maria. Phillips was active in civic affairs, one of his major interests being the Santa Barbara Boys Club. He was an original director of the Boys Club of America and a Scottish Rite Mason. He is survived by his widow, two sons and three grandchildren.

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Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings: $15.00 per inch for line listings.

Position and Help Wanted

REPRESENTATION WANTED

for broad line of industrial refrigeration equipment. Several territories having an excellent sales potential are available. Write to Imeco Incorporated, 3033 W. Belmont Ave., Chicago 18, Ill.

WANTED—Chief engineer, cold storage operation; multi plant company, eastern location. Full charge refrigeration and maintenance. Give experience, age, salary desired first letter. Write Box OT-6, c/o Industrial Refrigeration.

USED EQUIPMENT—wanted & for sale

FOR SALE—Two 9x9 2-cylinder York ammonia compressors complete with condenser, receiver, water cooler, surge drum, piping relief valves, auxiliaries, controls, starters and wiring. Originally new equipment, put in service 1950 and 1951. Address reply Box No. NV-3, c/o Industrial Refrigeration.

FOR SALE—York 50 h.p. "Freon" compressor and 6 Krack blowers. 1—10 h.p. "Freon" compressor and York ice machine. 2—only 3 h.p. "Freon" compressors; 4 GE blowers. Also Clayton boiler and chicken scalder with 600 ft. overhead conveyors. Phone 87-J or write Box 526, Jackson, Ohio.

WANTED—Would like to locate used modern V type ammonia compressors and evaporative condensers in good condition. Quote size, make, age, condition and price. Address Box NV-6, c/o Industrial Refrigeration.

WANTED—4 used 8x8 to 10½x10½ ammonia compressors, or in the V or VW type of 50 to 75 tons capacity. Write Box OT-2, c/o Industrial Refrigeration.

WANTED—Used ice plants and refrigeration equipment. Address Box OT-4, c/o Industrial Refrigeration.

FOR SALE — Refrigeration equipment; ice equipment; new, used. Advise us your needs. Use "QUICKSEAL" — stops brine tank leaks; easy, efficient, economical. Born Company, 80 East Jackson Boulevard, Chicago 4, Illinois. WAbash 2-3299

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Complete cold storage engine room ammonia equipment including Frick 11½ x 8 — D.C. to 60 h.p., 400 r.p.m. Worthington 7 x 7 D.C. to 50 h.p., 400 r.p.m. Worthington horizontal high-low duplex d.c. to 100 h.p., 225 r.p.m. Vilter 10½ x 10½ belt drive by 100 h.p., 1750 r.p.m. Vilter 9½ x 7 belt drive by 30 h.p., 1200 r.p.m. All force feed lubricated; motors 220 volt 3 phase. MG sets, starters, panels spare parts included.
CENTRAL WAREHOUSE COMPANY
739 Pillsbury Ave. St. Paul, Minn.
Phone: Midway 6-2831

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(1) 9 cylinder (2) 6 cylinder type AHP Frick "Eclipse" compressors.
(2) type 15Q6 Carrier cold air diffusers.
9x9 York "Duplex" 200 h.p. compressors.
7½x7½ York & 7x7 Frick compressors.
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MG sets, air compressors, water pumps, etc.
JOHN F. CARSON
A & Venango Sts. Philadelphia 34, Pa.
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FOR SALE—Fifty ton of re-granulated cork in 5 cu. ft. sacks. Richard L. Scott, Rt.2, Box 79, Grandview, Wash.

FOR SALE—One 4x4 twin cylinder York compressor with 7½ h.p. motor, V-belted, on one base. One 20" x 10 ft. receiver. Write E. Niebling, 1546 St. Clair, Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE—Brine tank, agitators, vertical, motors $75.00. Ice cans, 400 lbs., $3.00. Ice crusher. Vilter 9½x9½ with 60 h.p. motor. Vilter 5½x5½. Gordon Equipment Co., 6530 W. Jefferson, Detroit 17, Mich.

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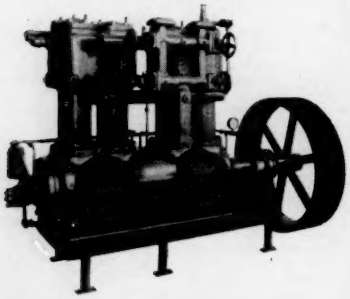

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You will be surprised at the wealth of material that has been included in this convenient and practical reference Note Book. It is written in layman's language, without complicated formulas. In short, it is a tool responsible for the operation of refrigeration equipment.

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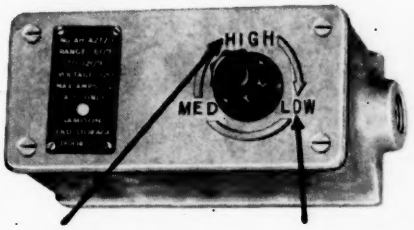
Armstrong INSULATIONS

New Jamison FROST has Adjustable Temperature Control

to prevent icing and freezing shut of cold storage doors

The new Jamison Frostop with adjustable temperature control is now available on Jamison Cold Storage Doors of many types and practically all sizes.

...thermostatically-controlled temperature range eliminates dangers of overheating or condensation of moisture due to unauthorized shut off.



120°—*above 120° excessive temperature damages frame and gaskets.*

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